TO AMEND THE NATIONAL AERONAUTICS AND SPACE ACT OF 1958

HEARINGS

BEFORE THE

COMMITTEE ON SCIENCE AND ASTRONAUTICS U.S. HOUSE OF REPRESENTATIVES

EIGHTY-SIXTH CONGRESS

SECOND SESSION

ON

H.R. 9675

MARCH 8, 9, 10, 14, 15, 16, 17, 21, 22, 24, 28, 29, 30, 31, AND APRIL 4, 1960

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TO AMEND THE NATIONAL AERONAUTICS AND SPACE ACT OF 1958

TUESDAY, MARCH 8, 1960

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND ASTRONAUTICS,
Washington, D.C.

The committee met at 10 a.m., Hon. Overton Brooks (chairman) presiding.

The CHAIRMAN. The committee will come to order.

Now, this morning we begin some very historic hearings. Before we begin, we have a report which has been pending from a subcommittee for a long time. The members of the subcommittee have been working on it since last October, to my knowledge, and they held hearings in October during recess.

Mr. Mitchell, are you ready to make a report on your subcommittee hearings? We will hear you at this time.

Mr. MITCHELL. Yes, Mr. Chairman. I would like to make a brief statement by way of presenting to the full committee a report of the Subcommittee on Patents and Scientific Inventions.

Pursuant to your instructions, Mr. Chairman, since last August the subcommittee has been studying the problem of amending the so-called patent section of the National Aeronautics and Space Act. This is a provision which has caused a great deal of discontent both in Government and in industrial circles. It is a provision for which the National Aeronautics and Space Administration is requesting an amendment. In fact, section 11 of H.R. 9675, the bill we are taking up this morning, is directed to just this end.

The subcommittee has held extensive hearings on the problem, and we believe that the record thus compiled is one of the most complete and useful documents of its kind in existence. Since January, the subcommittee has been meeting intermittently in executive session in efforts to digest the vast amount of information and argument placed before it.

May I say this, Mr. Chairman, about the executive sessions that we have held: I think in every instance every member of the subcommittee has been present. This has not been an easy task, because the matter is both controversial and complex.

But on last Wednesday, March 2, the subcommittee completed its work and voted to report to the full committee a proposed provision with the recommendation that it be substituted for the current section 305 of the National Aeronautics and Space Act. The text of the subcommittee's proposal will be found in the report which is before you.

Let me point out that under the present "patent" section of the

Space Act, NASA is required to secure ownership of inventions produced under its contracts with private concerns. These rights to title can be waived but the act makes it very difficult to do so. NASA is now recommending a change in the law which—within limits—would give the Administrator discretion whether or not to take title to such inventions. The text of NASA's proposal is on page 11 of the report.

For reasons carefully spelled out in the report, the subcommittee is unanimous in agreement that a change in the law is needed, and needed now. While members have not agreed on the best method of effecting that change, the recommended proposal is one to which a majority of the subcommittee subscribes as a reasonable and realistic approach to the problem. The subcommittee agrees with the NASA philosophy in principle, but it has made a number of important changes to the NASA proposal which are designed to assure that the public interest is protected and at the same time to ease the administrative burden on the space agency insofar as possible. In addition it has formulated a statement of congressional intent to serve as a specific guide to the Administrator in making decisions on invention-ownership problems.

I might add here that we have been in close touch with NASA officials and that the amendments made by the subcommittee will receive that Administration's support. Is that correct, Dr. Glennan?

Dr. GLENNAN. That is correct.

Mr. MITCHELL. Mr. Chairman, a majority of the subcommittee is convinced that the patent section of the current law is tending to retard and complicate the American space program. Obviously the Nation cannot afford this. Therefore, the subcommittee recommends (1) that the full committee approve the suggested proposal for a patent provision, (2) that it approve the statement of intent as part of the legislative history of the provision, and (3) that the full committee consider these matters in the course of its deliberations on H.R. 9675, the bill to revise the Space Act.

Mr. Chairman, I submit this report on behalf of the subcommittee and move its adoption and publication by the full committee. I might say at that point that, as you know, this does not bind the full committee to any action the subcommittee has taken, but would simply permit the report to be released to the public and, of course, to the committee for further study.

The CHAIRMAN. And release the subcommittee from further action?

Mr. MITCHELL. That is correct, Mr. Chairman.

The CHAIRMAN. Was it a unanimous report?

Mr. MITCHELL. The report was not unanimous.

The CHAIRMAN. Was not unanimous.

Mr. MITCHELL. There are other members of the subcommittee here who might like to make some comment at this time, Mr. Chairman.

The CHAIRMAN. Are there any further statements by any members of the subcommittee?

Mr. Daddario?

Mr. DADDARIO. Mr. Chairman, in answer to your question I would like to point out that although it was not unanimous, the vote was two votes against and five for.

The CHAIRMAN. Five to two.

Mr. DADDARIO. Yes, and I would like to compliment Mr. Mitchell, as chairman of the subcommittee, for directing the efforts of the subcommittee members over a long period of time and through an arduous and complicated set of hearings to the end that we were able to get such a favorable vote. I think it would be impossible, taking into consideration the philosophical problems behind these things, to get a unanimous vote. To have gotten a five to two vote under these conditions, to have held such a fine set of hearings, and to have made what I feel is an excellent report, is a task for which Mr. Mitchell should be complimented, for he bore the greater part of the burden. Further, I want to compliment the other members of the subcommittee for having paid such close attention to this problem, for having worked so hard on it, and for having contributed so much in coming to these final conclusions. I urge, with Mr. Mitchell, that the report be supported by the full committee.

The CHAIRMAN. I suggest that the report of the subcommittee be released to the press, to the public, and to the members of the committee. Is there any objection to that action?

Mr. QUIGLEY. Mr. Chairman, I would like to be associated with the comments of my colleague from Connecticut, and particularly to pay tribute to the chairman of the subcommittee who did an excellent job. He strived valiantly to come up with a unanimous report, and I regret that the Congressman from Pennsylvania and the Congressman from New Hampshire were adamant in their respective positions, both of which differed quite a bit. But the subcommittee did do an excellent job and they did make a real try. I don't really believe they have come up with the answer, but I think the majority deserve a great big "A" for effort. I regret that I do find it necessary to be in the minority, and I am afraid as of the moment I am going to have to persist in that position.

The CHAIRMAN. Mr. King?

Mr. KING. Mr. Chairman, I should like to associate myself with the remarks of the gentlemen from Connecticut and from Pennsylvania, about Mr. Mitchell's chairing of this subcommittee. I thought it was masterful. Although I did dissent on one or two issues, intermediate issues, when the report was finally presented for approval, I sustained it, and I feel that this is a position that is very tenable and which I will be very glad to defend on the floor of the House, if necessary.

The CHAIRMAN. Mr. Fulton?

Mr. FULTON. I yield to Mr. Anfuso.

Mr. ANFUSO. Mr. Chairman, I was not a member of this subcommittee but I have one sad note to place on the record. I regret exceedingly that Judge Mitchell has not chosen to run again for Congress. I think he has been one of the most valuable members of this committee, and also of the Congress, and I am hoping that maybe other members—I know I have failed—can put pressure upon him to reconsider. He certainly will be a great loss to this Congress and to the Nation.

Mr. MITCHELL. Thank you.

The CHAIRMAN. Any further comments?

Mr. QUIGLEY. Would the gentleman yield?

Mr. ANFUSO. Yes.

Mr. QUIGLEY. Do you think if I were to go along with the majority, this would influence him and cause him to reconsider?

Mr. ANFUSO. Maybe so.

Mr. QUIGLEY. I would be sorely tempted to do so if I were sure of this result.

Mr. MITCHELL. May I say off the record.

(Discussion off the record.)

The CHAIRMAN. Mr. Fulton?

Mr. FULTON. I think it should be put in record that this was a hard-working subcommittee and that Mr. Chenoweth, who is not here this morning, was a hard-working member.

This particular report is the result of much study and the advice of Attorney George Feldman, who was counsel to the subcommittee. I must say each of us had a variety of views on many subjects.

I believe the Chairman, Mr. Mitchell, would agree with me that this is pretty much a solution of the views between NASA and various members of the committee, as well as the people who appeared for private industry, and the patent associations. We were trying to obtain a middle ground that was moving in the direction of private industry participation. We attempted to formulate a set of ground rules that, it seems to me, as a corporation counsel of some experience, should be given some tryout. I would compliment both the chairman and the other members of the subcommittee on the intensive work that was done. I have been in Congress quite a few years and I know of no subcommittee assigned a specific study that has worked any harder nor taken any greater responsibility than this subcommittee.

So I would like to compliment each one of the members on the subcommittee, without any restriction.

The CHAIRMAN. I think the subcommittee has been well complimented and I do think that they have——

Mr. FULTON. I did want to say this, that while there is a difference of opinion at the end, nevertheless, it was like the Remagen bridge that swayed and seemed to give, but they finally recovered themselves and stood firm. And we do have a minority viewpoint, both by the gentleman from Pennsylvania, Mr. Quigley, as well as the gentleman from New Hampshire, Mr. Bass.

May I conclude by saying that I don't recall at any particular time, Mr. Chairman, that there was one vote along party lines. Is that not right?

(Mr. Mitchell nods).

Mr. FULTON. They had many votes and sometimes the combinations were extremely surprising. More the senior members of the subcommittee voting against the other end.

The CHAIRMAN. Mr. Mitchell, with a few more of those, you will have a clear majority and it won't be necessary to vote on your motion. [Laughter.]

Mr. FULTON. Off the record.

(Discussion off the record.)

The CHAIRMAN. This morning two of our main witnesses, Dr. Glennan and Dr. Dryden have to be at the White House at—what time is it, 11 o'clock?

Dr. GLENNAN. Eleven thirty.

The CHAIRMAN. At that time Dr. Dryden will be the recipient of a real honor to be given by Dr. Glennan in the presence of the

President. I want to congratulate Dr. Dryden publicly. I think Dr. Dryden has been a leader in the whole program from NACA down through NASA, and I am glad personally that that recognition is properly falling gracefully upon your shoulders.

Dr. DRYDEN. Thank you.

Mr. ANFUSO. May I add one word: Dr. Dryden has done a great job in promoting international cooperation in the peaceful uses of outer space.

The CHAIRMAN. I think we all have confidence in you. We are all happy for that.

Mr. FULTON. This must be the climate this morning. [Laughter.]

The CHAIRMAN. If there is no opposition to the report of the Subcommittee on Patents, it will be adopted by this committee.

Now, Mr. Mitchell, will you see that copies of that report are made available to all the members of the committee? I want to ask the members in their leisure time—we don't propose to give you much leisure—but in your leisure time to study that report very carefully, because it will undoubtedly be the subject of some legislation later on.

I join with the others in saying that you have done a splendid job and that we, with reluctance, see you retire from the field of active congressional politics.

Mr. MITCHELL. Thank you, Mr. Chairman.

Mr. FULTON. Can we have a vote on that? I think the people who are disagreeing ought to have a chance.

The CHAIRMAN. Is there any opposition at all? There is no opposition.

Mr. QUIGLEY. As I understand, this is merely a motion for the subcommittee's report to be accepted, not approved?

The CHAIRMAN. That is right, and publicized. So it is unanimous.

(The text of the subcommittee report will be found in app. I, p. 573.)

Mr. WOLF. Mr. Chairman, everybody has been saying such nice things about Mr. Mitchell that I want to put on the record what I told him privately yesterday. I said I felt he is a fine man, and we will miss him very much on this committee.

The CHAIRMAN. That makes a good man. [Laughter.]

Mr. FULTON. Let's ask him.

(Discussion off the record.)

The CHAIRMAN. Now, at this time, the committee will recess for 2 minutes. I promised the reporters that they could make some pictures of our distinguished witnesses.

(Short recess taken.)

The CHAIRMAN. The committee will come to order. This morning, gentlemen of the committee, the full committee begins hearings on H.R. 9675. This bill has been submitted by the administration and at its request, I have introduced it. I might point out that this bill is a piece of major legislation. It represents the first important revision to the National Aeronautics and Space Act of 1958, since that law was enacted almost 2 years ago. The bill contains a number of revisions which are going to demand the close attention of this committee and of the Congress as a whole.

This bill would abolish both the National Aeronautics and Space Council and the Civilian-Military Liaison Committee. It would modify the patents section of the "Space Act," it would provide

a new indemnification section to the act, and it undertakes to make a number of other technical changes.

(The "Space Act" and proposed changes follow:)

EXISTING LAW IN WHICH NO CHANGE IS PROPOSED IS SHOWN IN ROMAN TYPE.

EXISTING LAW PROPOSED TO BE OMITTED IS SHOWN IN [BLACK BRACKETS].

NEW MATTER IS SHOWN IN ITALIC TYPE.

TITLE I—SHORT TITLE, DECLARATION OF POLICY, AND DEFINITIONS

SHORT TITLE

SEC. 101. This Act may be cited as the "National Aeronautics and Space Act of 1958".

DECLARATION OF POLICY AND PURPOSE

SEC. 102. (a) The Congress hereby declares that it is the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all mankind.

[(b) The Congress declares that the general welfare and security of the United States require that adequate provision be made for aeronautical and space activities. The Congress further declares that such activities shall be the responsibility of, and shall be directed by, a civilian agency exercising control over aeronautical and space activities sponsored by the United States, except that activities peculiar to or primarily associated with the development of weapons systems, military operations, or the defense of the United States (including the research and development necessary to make effective provision for the defense of the United States) shall be the responsibility of, and shall be directed by, the Department of Defense; and that determination as to which such agency has responsibility for and direction of any such activity shall be made by the President in conformity with section 201(e).

[(c) The aeronautical and space activities of the United States shall be conducted so as to contribute materially to one or more of the following objectives:]

(b) The Congress declares that the general welfare and security of the United States require that adequate provision be made for the exploration, scientific investigation, and utilization of space for peaceful purposes, and for research into problems of flight within and outside the earth's atmosphere. The Congress further declares that such activities shall be conducted so as to contribute materially to the following objectives:

(1) The expansion of human knowledge of phenomena in the atmosphere and space;

(2) The improvement of the usefulness, performance, speed, safety, and efficiency of aeronautical and space vehicles;

(3) The development and operation of vehicles capable of carrying instruments, equipment, supplies, and living organisms through space;

(4) The establishment of long-range studies of the potential benefits to be gained from, the opportunities for, and the problems involved in the utilization of aeronautical and space activities for peaceful and scientific purposes;

(5) The preservation of the role of the United States as a leader in aeronautical and space science and technology and in the application thereof to the conduct of peaceful activities within and outside the atmosphere;

(6) The making available to agencies directly concerned with national defense of discoveries that have military value or significance, and the furnishing by such agencies, to the civilian agency established to direct and control nonmilitary aeronautical and space activities, of information as to discoveries which have value or significance to that agency;

(7) Cooperation by the United States with other nations and groups of nations in work done pursuant to this Act and in the peaceful application of the results thereof; and

(8) The most effective utilization of the scientific and engineering resources of the United States, with close cooperation among all interested agencies of the United States in order to avoid unnecessary duplication of effort, facilities, and equipment.

(c) *The Congress further declares that the exploration, scientific investigation, and utilization of space for peaceful purposes shall be the responsibility of, and shall be directed by, a civilian agency.*

(d) It is the purpose of this Act to carry out and effectuate the policies declared in subsections (a), (b), and (c).

DEFINITIONS

SEC. 103. As used in this Act—

[(1) the term "aeronautical and space activities" means (A) research into, and the solution of, problems of flight within and outside the earth's atmosphere, (B) the development, construction, testing, and operation for research purposes of aeronautical and space vehicles, and (C) such other activities as may be required for the exploration of space; and

[(2) the term "aeronautical and space vehicles" means aircraft, missiles, satellites, and other space vehicles, manned and unmanned, together with related equipment, devices, components, and parts.]

(1) the term "spacecraft" means devices, manned and unmanned, which are designed to be placed into an orbit about the earth or into a trajectory to another celestial body, including all instrumentation, propulsion, and guidance contained therein;

(2) the term "launch vehicles" means devices which propel and guide spacecraft into an orbit about the earth or into a trajectory to another celestial body and includes all stages of multistage rockets used for such purposes;

(3) the term "space vehicles" means spacecraft, launch vehicles, and all other vehicles, except ballistic missiles, capable of flight without support from or dependence upon the earth's atmosphere, together with related equipment, devices, components, and parts; and

(4) the term "aeronautical vehicles" means all vehicles, other than space vehicles, designed for flight, together with related equipment, devices, components, and parts.

[TITLE II—COORDINATION OF AERONAUTICAL AND SPACE ACTIVITIES

[NATIONAL AERONAUTICS AND SPACE COUNCIL

[SEC. 201. (a) There is hereby established the National Aeronautics and Space Council (hereinafter called the "Council") which shall be composed of—

[(1) the President (who shall preside over meetings of the Council);

[(2) the Secretary of State;

[(3) the Secretary of Defense;

[(4) the Administrator of the National Aeronautics and Space Administration;

[(5) the Chairman of the Atomic Energy Commission;

[(6) not more than one additional member appointed by the President from the Departments and agencies of the Federal Government; and

[(7) not more than three other members appointed by the President, solely on the basis of established records of distinguished achievement, from among individuals in private life who are eminent in science, engineering, technology, education, administration, or public affairs.

[(b) Each member of the Council from a department or agency of the Federal Government may designate another officer of his department or agency to serve on the Council as his alternate in his unavoidable absence.

[(c) Each member of the Council appointed or designated under paragraphs (6) and (7) of subsection (a), and each alternate member designated under subsection (b), shall be appointed or designated to serve as such by and with the advice and consent of the Senate, unless at the time of such appointment or designation he holds an office in the Federal Government to which he was appointed by and with the advice and consent of the Senate.

[(d) It shall be the function of the Council to advise the President with respect to the performance of the duties prescribed in subsection (e) of this section.

[(e) In conformity with the provisions of section 102 of this Act, it shall be the duty of the President to—

[(1) survey all significant aeronautical and space activities, including the policies, plans, programs, and accomplishments of all agencies of the United States engaged in such activities;

[(2) develop a comprehensive program of aeronautical and space activities to be conducted by agencies of the United States;

[(3) designate and fix responsibility for the direction of major aeronautical and space activities;

[(4) provide for effective cooperation between the National Aeronautics and Space Administration and the Department of Defense in all such activities, and specify which of such activities may be carried on concurrently by both such agencies notwithstanding the assignment of primary responsibility therefor to one or the other of such agencies; and

[(5) resolve differences arising among departments and agencies of the United States with respect to aeronautical and space activities under this Act, including differences as to whether a particular project is an aeronautical and space activity.

[(f) The Council may employ a staff to be headed by a civilian executive secretary who shall be appointed by the President by and with the advice and consent of the Senate and shall receive compensation at the rate of $20,000 a year. The executive secretary, subject to the direction of the Council, is authorized to appoint and fix the compensation of such personnel, including not more than three persons who may be appointed without regard to the civil service laws or the Classification Act of 1949 and compensated at the rate of not more than $19,000 a year, as may be necessary to perform such duties as may be prescribed by the Council in connection with the performance of its functions. Each appointment under this subsection shall be subject to the same security requirements as those established for personnel of the National Aeronautics and Space Administration appointed under section 203(b)(2) of this Act.

[(g) Members of the Council appointed from private life under subsection (a) (7) may be compensated at a rate not to exceed $100 per diem, and may be paid travel expenses and per diem in lieu of subsistence in accordance with the provisions of section 5 of the Administrative Expenses Act of 1946 (5 U.S.C. 73b–2) relating to persons serving without compensation.]

TITLE II—NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

[NATIONAL AERONAUTICS AND SPACE ADMINISTRATION]

ADMINISTRATOR AND DEPUTY ADMINISTRATOR

SEC. [202] *201.* (a) There is hereby established the National Aeronautics and Space Administration (hereinafter called the "Administration"). The Administration shall be headed by an Administrator, who shall be appointed from civilian life by the President by and with the advice and consent of the Senate, and shall receive compensation at the rate of $22,500 per annum. Under the supervision and direction of the President, the Administrator shall be responsible for the exercise of all powers and the discharge of all duties of the Administration, and shall have authority and control over all personnel and activities thereof.

(b) There shall be in the Administration a Deputy Administrator, who shall be appointed from civilian life by the President by and with the advice and consent of the Senate, shall receive compensation at the rate of $21,500 per annum, and shall perform such duties and exercise such powers as the Administrator may prescribe. The Deputy Administrator shall act for, and exercise the powers of, the Administrator during his absence or disability.

(c) The Administrator and the Deputy Administrator shall not engage in any other business, vocation, or employment while serving as such.

FUNCTIONS OF THE ADMINISTRATION

SEC. [203] *202.* (a) The Administration, in order to carry out the purpose of this Act, shall—

[(1) plan, direct, and conduct aeronautical and space activities;]

(1) conduct research into problems of flight within and outside the earth's atmosphere with a view to their practical solution;

(2) conduct such activities as may be required for the exploration, scientific investigation, and utilization of space for peaceful purposes, and develop space vehicles for use in such activities;

[(2)] *(3)* arrange for participation by the scientific community in planning scientific measurements and observations to be made through use of aeronautical and space vehicles, and conduct or arrange for the conduct of such measurements and observations; and

[(3)] *(4)* provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof.

(b) In the performance of its functions the Administration is authorized—

(1) to make, promulgate, issue, rescind, and amend rules and regulations governing the manner of its operations and the exercise of the powers vested in it by law;

(2) to appoint and fix the compensation of such officers and employees as may be necessary to carry out such functions. Such officers and employees shall be appointed in accordance with the civil service laws and their compensation fixed in accordance with the Classification Act of 1949, except that (A) to the extent the Administrator deems such action necessary to the discharge of his responsibilities, he may appoint and fix the compensation (up to a limit of $19,000 a year, or up to a limit of $21,000 a year for a maximum of ten positions) of not more than two hundred and sixty of the scientific, engineering, and administrative personnel of the Administration without regard to such laws, and (B) to the extent the Administrator deems such action necessary to recruit specially qualified scientific and engineering talent, he may establish the entrance grade for scientific and engineering personnel without previous service in the Federal Government at a level up to two grades higher than the grade provided for such personnel under the General Schedule established by the Classification Act of 1949, and fix their compensation accordingly;

(3) to acquire (by purchase, lease, condemnation, or otherwise), construct, improve, repair, operate, and maintain laboratories, research and testing sites and facilities, aeronautical and space vehicles, quarters and related accommodations for employees and dependents of employees of the Administration, and such other real and personal property (including patents), or any interest therein, as the Administration deems necessary within and outside the continental United States; to acquire by lease or otherwise, through the Administrator of General Services, buildings or parts of buildings in the District of Columbia for the use of the Administration for a period not to exceed ten years without regard to the Act of March 3, 1877 (40 U.S.C. 34) *to lease to others such*

real and personal property, and such lease may provide, notwithstanding section 321 of the Act of June 30, 1932 (40 U.S.C. 303b), or any other provision of law, for the maintenance, protection, repair, or restoration, by the lessee, of the property leased, or of the entire unit or installation where a substantial part of it is leased, as part or all of the consideration for the lease; [to lease to others such real and personal property;] to sell and otherwise dispose of real and personal property (including patents and rights thereunder) in accordance with the provisions of the Federal Property and Administrative Services Act of 1949, as amended (40 U.S.C. 471 et seq.); and to provide by contract or otherwise for cafeterias and other necessary facilities for the welfare of employees of the Administration at its installations and purchase and maintain equipment therefor;

(4) to accept unconditional gifts or donations of services, money, or property, real, personal, or mixed, tangible or intangible;

(5) without regard to section 3648 of the Revised Statutes, as amended (31 U.S.C. 529), to enter into and perform such contracts, leases, cooperative agreements, or other transactions as may be necessary in the conduct of its work and on such terms as it may deem appropriate, with any agency or instrumentality of the United States, or with any State, Territory, or possession, or with any political subdivision thereof, or with any person, firm, association, corporation, or educational institution. To the maximum extent practicable and consistent with the accomplishment of the purpose of this Act, such contracts, leases, agreements, and other transactions shall be allocated by the Administrator in a manner which will enable small business concerns to participate equitably and proportionately in the conduct of the work of the Administration;

(6) to use, with their consent, the services, equipment, personnel, and facilities of Federal and other agencies with or without reimbursement, and on a similar basis to cooperate with other public and private agencies and instrumentalities in the use of services, equipment, and facilities. Each department and agency of the Federal Government shall cooperate fully with the Administration in making its services, equipment, personnel, and facilities available to the Administration, and any such department or agency is authorized, notwithstanding any other provision of law, *to obtain by contract for*, to transfer to or to receive from the Administration, without reimbursement, aeronautical and space vehicles, and supplies and equipment other than administrative supplies or equipment;

(7) to appoint such advisory committees as may be appropriate for purposes of consultation and advice to the Administration in the performance of its functions;

(8) to establish within the Administration such offices and procedures as may be appropriate to provide for the greatest possible coordination of its activities under this Act with related scientific and other activities being carried on by other public and private agencies and organizations;

(9) to obtain services as authorized by section 15 of the Act of August 2, 1946 (5 U.S.C. 55a), at rates not to exceed $100 per diem for individuals;

(10) when determined by the Administrator to be necessary, and subject to such security investigations as he may determine to be appropriate, to employ aliens without regard to statutory provisions prohibiting payment of compensation to aliens;

(11) to employ retired commissioned officers of the armed forces of the United States and compensate them at the rate established for the positions occupied by them within the Administration, subject only to the limitations in pay set forth in section 212 of the Act of June 30, 1932, as amended (5 U.S.C. 59a);

(12) with the approval of the President, to enter into cooperative agreements under which members of the Army, Navy, Air Force, and Marine Corps may be detailed by the appropriate Secretary for services in the performance of functions under this Act to the same extent as that to which they might be lawfully assigned in the Department of Defense; and

(13)(A) to consider, ascertain, adjust, determine, settle, and pay, on behalf of the United States, in full satisfaction thereof, any claim for $5,000 or less against the United States for bodily injury, death, or damage to or loss of real or personal property resulting from the conduct of the Administration's functions as specified in subsection (a) of this section, where such claim is presented to the Administration in writing within two years after the accident or incident out of which the claim arises; and

(B) if the Administration considers that a claim in excess of $5,000 is meritorious and would otherwise be covered by this paragraph, to report the facts and circumstances thereof to the Congress for its consideration.

(14) to acquire releases, before suit is brought, for past infringement of patents.

[CIVILIAN-MILITARY LIAISON COMMITTEE

[SEC. 204. (a) There shall be a Civilian-Military Liaison Committee consisting

[(1) a Chairman, who shall be the head thereof and who shall be appointed by the President, shall serve at the pleasure of the President, and shall receive compensation (in the manner provided in subsection (d)) at the rate of $20,000 per annum;

[(2) one or more representatives from the Department of Defense, and one or more representatives from each of the Departments of the Army, Navy, and Air Force, to be assigned by the Secretary of Defense to serve on the Committee without additional compensation; and

[(3) representatives from the Administration, to be assigned by the Administrator to serve on the Committee without additional compensation, equal in number to the number of representatives assigned to serve on the Committee under paragraph (2).

[(b) The Administration and the Department of Defense, through the Liaison Committee, shall advise and consult with each other on all matters within their respective jurisdictions relating to aeronauti-

cal and space activities and shall keep each other fully and currently informed with respect to such activities.

[(c) If the Secretary of Defense concludes that any request, action, proposed action, or failure to act on the part of the Administrator is adverse to the responsibilities of the Department of Defense, or the Administrator concludes that any request, action, proposed action, or failure to act on the part of the Department of Defense is adverse to the responsibilities of the Administration, and the Administrator and the Secretary of Defense are unable to reach an agreement with respect thereto, either the Administrator or the Secretary of Defense may refer the matter to the President for his decision (which shall be final) as provided in section 201(e).

[(d) Notwithstanding the provisions of any other law, any active or retired officer of the Army, Navy, or Air Force may serve as Chairman of the Liaison Committee without prejudice to his active or retired status as such officer. The compensation received by any such officer for his service as Chairman of the Liaison Committee shall be equal to the amount (if any) by which the compensation fixed by subsection (a)(1) for such Chairman exceeds his pay and allowances (including special and incentive pays) as an active officer, or his retired pay.]

INTERNATIONAL COOPERATION

SEC. [205] *203*. The Administration, under the foreign policy guidance of the President, may engage in a program of international cooperation in work done pursuant to this Act, and in the peaceful application of the results thereof, pursuant to agreements made by the President with the advice and consent of the Senate.

REPORTS TO THE CONGRESS

SEC. [206] *204*. (a) The Administration shall submit to the President for transmittal to the Congress, semiannually and at such other times as it deems desirable, a report of its activities and accomplishments.

[(b) The President shall transmit to the Congress in January of each year a report, which shall include (1) a comprehensive description of the programed activities and the accomplishments of all agencies of the United States in the field of aeronautics and space activities during the preceding calendar year, and (2) an evaluation of such activities and accomplishments in terms of the attainment of, or the failure to attain, the objectives described in section 102(c) of this Act.

[(c) Any report made under this section shall contain such recommendations for additional legislation as the Administrator or the President may consider necessary or desirable for the attainment of the objectives described in section 102(c) of this Act.]

[(d)] *(b)* No information which has been classified for reasons of national security shall be included in any report made under this section, unless such information has been declassified by, or pursuant to authorization given by the President.

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TITLE III—MISCELLANEOUS

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

SEC. 301. (a) The National Advisory Committee for Aeronautics, on the effective date of this section, shall cease to exist. On such date all functions, powers, duties, and obligations, and all real and personal property, personnel (other than members of the Committee), funds, and records of that organization, shall be transferred to the Administration.

(b) Section 2302 of title 10 of the United States Code is amended by striking out "or the Executive Secretary of the National Advisory Committee for Aeronautics." and inserting in lieu thereof "or the Administrator of the National Aeronautics and Space Administration."; and section 2303 of such title 10 is amended by striking out "The National Advisory Committee for Aeronautics." and inserting in lieu thereof "The National Aeronautics and Space Administration."

(c) The first section of the Act of August 26, 1950 (5 U.S.C. 22–1), is amended by striking out "the Director, National Advisory Committee for Aeronautics" and inserting in lieu thereof "the Administrator of the National Aeronautics and Space Administration", and by striking out "or National Advisory Committee for Aeronautics" and inserting in lieu thereof "or National Aeronautics and Space Administration".

(d) The Unitary Wind Tunnel Plan Act of 1949 (50 U.S.C. 511–515) is amended (1) by striking out "The National Advisory Committee for Aeronautics (hereinafter referred to as the 'Committee')" and inserting in lieu thereof "The Administrator of the National Aeronautics and Space Administration (hereinafter referred to as the 'Administrator')"; (2) by striking out "Committee" or "Committee's" wherever they appear and inserting in lieu thereof "Administrator" and "Administrator's", respectively; and (3) by striking out "its" wherever it appears and inserting in lieu thereof "his".

(e) This section shall take effect ninety days after the date of the enactment of this Act, or on any earlier date on which the Administrator shall determine, and announce by proclamation published in the Federal Register, that the Administration has been organized and is prepared to discharge the duties and exercise the powers conferred upon it by this Act.

TRANSFER OF RELATED FUNCTIONS

SEC. 302. (a) Subject to the provisions of this section, the President, for a period of four years after the date of enactment of this Act, may transfer to the Administration any functions (including powers, duties, activities, facilities, and parts of functions) of any other department or agency of the United States, or of any officer or organizational entity thereof, which relate primarily to the functions, powers, and duties of the Administration as prescribed by section 203 of this Act. In connection with any such transfer, the President may, under this section or other applicable authority, provide for appropriate transfers of records, property, civilian personnel, and funds.

(b) Whenever any such transfer is made before January 1, 1959, the President shall transmit to the Speaker of the House of Repre-

sentatives and the President pro tempore of the Senate a full and complete report concerning the nature and effect of such transfer.

(c) After December 31, 1958, no transfer shall be made under this section until (1) a full and complete report concerning the nature and effect of such proposed transfer has been transmitted by the President to the Congress, and (2) the first period of sixty calendar days of regular session of the Congress following the date of receipt of such report by the Congress has expired without the adoption by the Congress of a concurrent resolution stating that the Congress does not favor such transfer.

ACCESS TO INFORMATION

SEC. 303. Information obtained or developed by the Administrator in the performance of his functions under this Act shall be made available for public inspection, except (A) information authorized or required by Federal statute to be withheld, and (B) information classified to protect the national security: *Provided*, That nothing in this Act shall authorize the withholding of information by the Administrator from the duly authorized committees of the Congress.

SECURITY

SEC. 304. (a) The Administrator shall establish such security requirements, restrictions, and safeguards as he deems necessary in the interest of the national security. The Administrator may arrange with the Civil Service Commission for the conduct of such security or other personnel investigations of the Administration's officers, employees, and consultants, and its contractors and subcontractors and their officers and employees, actual or prospective, as he deems appropriate; and if any such investigation develops any data reflecting that the individual who is the subject thereof is of questionable loyalty the matter shall be referred to the Federal Bureau of Investigation for the conduct of a full field investigation, the results of which shall be furnished to the Administrator.

(b) The Atomic Energy Commission may authorize any of its employees, or employees of any contractor, prospective contractor, licensee, or prospective licensee of the Atomic Energy Commission or any other person authorized to have access to Restricted Data by the Atomic Energy Commission under subsection 145 b. of the Atomic Energy Act of 1954 (42 U.S.C. 2165(b)), to permit [any member, officer, or employee of the Council, or] the Administrator, or any officer, employee, member of an advisory committee, contractor, subcontractor, or officer or employee of a contractor or subcontractor of the Administration, to have access to Restricted Data relating to aeronautical and space activities which is required in the performance of his duties and so certified by the [Council or the] Administrator, [as the case may be,] *or designee thereof*, but only if (1) the [Council or the] Administrator or designee thereof has determined, in accordance with the established personnel security procedures and standards of the [Council or] Administration, that permitting such individual to have access to such Restricted Data will not endanger the common defense and security, and (2) the [Council or] Administrator or designee thereof finds that the established personnel and other security procedures and standards of the [Council or] Administration are

adequate and in reasonable conformity to the standards established by the Atomic Energy Commission under section 145 of the Atomic Energy Act of 1954 (42 U.S.C. 2165). Any individual granted access to such Restricted Data pursuant to this subsection may exchange such Data with any individual who (A) is an officer or employee of the Department of Defense, or any department or agency thereof, or a member of the armed forces, or a contractor or subcontractor of any such department, agency, or armed force, or an officer or employee of any such contractor or subcontractor, and (B) has been authorized to have access to Restricted Data under the provisions of section 143 of the Atomic Energy Act of 1954 (42 U.S.C. 2163).

(c) Chapter 37 of title 18 of the United States Code (entitled Espionage and Censorship) is amended by—

(1) adding at the end thereof the following new section:

"§ 799. Violation of regulations of National Aeronautics and Space Administration

"Whoever willfully shall violate, attempt to violate, or conspire to violate any regulation or order promulgated by the Administrator of the National Aeronautics and Space Administration for the protection or security of any laboratory, station, base or other facility, or part thereof, or any [aircraft, missile, spacecraft, or similar vehicle,] *aeronautical or space vehicle* or part thereof, or other property or equipment in the custody of the Administration, or any real or personal property or equipment in the custody of any contractor under any contract with the Administration or any subcontractor of any such contractor, shall be fined not more than $5,000, or imprisoned not more than one year, or both."

(2) adding at the end of the sectional analysis thereof the following new item:

"799. Violation of regulations of National Aeronautics and Space Administration."

(d) Section 1114 of title 18 of the United States Code is amended by inserting immediately before "while engaged in the performance of his official duties" the following: "or any officer or employee of the National Aeronautics and Space Administration directed to guard and protect property of the United States under the administration and control of the National Aeronautics and Space Administration,".

(e) The Administrator may direct such of the officers and employees of the Administration as he deems necessary in the public interest to carry firearms while in the conduct of their official duties. The Administrator may also authorize such of those employees of the contractors and subcontractors of the Administration engaged in the protection of property owned by the United States and located at facilities owned by or contracted to the United States as he deems necessary in the public interest, to carry firearms while in the conduct of their official duties.

PROPERTY RIGHTS IN INVENTIONS

[SEC. 305. (a) Whenever any invention is made in the performance of any work under any contract of the Administration, and the Administrator determines that—

[(1) the person who made the invention was employed or assigned to perform research, development, or exploration work

and the invention is related to the work he was employed or assigned to perform, or that it was within the scope of his employment duties, whether or not it was made during working hours, or with a contribution by the Government of the use of Government facilities, equipment, materials, allocated funds, information proprietary to the Government, or services of Government employees during working hours; or

[(2) the person who made the invention was not employed or assigned to perform research, development, or exploration work, but the invention is nevertheless related to the contract, or to the work or duties he was employed or assigned to perform, and was made during working hours, or with a contribution from the Government of the sort referred to in clause (1),

such invention shall be the exclusive property of the United States, and if such invention is patentable a patent therefor shall be issued to the United States upon application made by the Administrator, unless the Administrator waives all or any part of the rights of the United States to such invention in conformity with the provisions of subsection (f) of this section.

[(b) Each contract entered into by the Administrator with any party for the performance of any work shall contain effective provisions under which such party shall furnish promptly to the Administrator a written report containing full and complete technical information concerning any invention, discovery, improvement, or innovation which may be made in the performance of any such work.

[(c) No patent may be issued to any applicant other than the Administrator for any invention which appears to the Commissioner of Patents to have significant utility in the conduct of aeronautical and space activities unless the applicant files with the Commissioner, with the application or within thirty days after request therefor by the Commissioner, a written statement executed under oath setting forth the full facts concerning the circumstances under which such invention was made and stating the relationship (if any) of such invention to the performance of any work under any contract of the Administration. Copies of each such statement and the application to which it relates shall be transmitted forthwith by the Commissioner to the Administrator.

[(d) Upon any application as to which any such statement has been transmitted to the Administrator, the Commissioner may, if the invention is patentable, issue a patent to the applicant unless the Administrator, within ninety days after receipt of such application and statement, requests that such patent be issued to him on behalf of the United States. If, within such time, the Administrator files such a request with the Commissioner, the Commissioner shall transmit notice thereof to the applicant, and shall issue such patent to the Administrator unless the applicant within thirty days after receipt of such notice requests a hearing before a Board of Patent Interferences on the question whether the Administrator is entitled under this section to receive such patent. The Board may hear and determine, in accordance with rules and procedures established for interference cases, the question so presented, and its determination shall be subject to appeal by the applicant or by the Administrator to the Court of Customs and Patent Appeals in accordance with procedures governing

appeals from decisions of the Board of Patent Interferences in other proceedings.

[(e) Whenever any patent has been issued to any applicant in conformity with subsection (d), and the Administrator thereafter has reason to believe that the statement filed by the applicant in connection therewith contained any false representation of any material fact, the Administrator within five years after the date of issuance of such patent may file with the Commissioner a request for the transfer to the Administrator of title to such patent on the records of the Commissioner. Notice of any such request shall be transmitted by the Commissioner to the owner of record of such patent, and title to such patent shall be so transferred to the Administrator unless within thirty days after receipt of such notice such owner of record requests a hearing before a Board of Patent Interferences on the question whether any such false representation was contained in such statement. Such question shall be heard and determined, and determination thereof shall be subject to review, in the manner prescribed by subsection (d) for questions arising thereunder. No request made by the Administrator under this subsection for the transfer of title to any patent, and no prosecution for the violation of any criminal statute, shall be barred by any failure of the Administrator to make a request under subsection (d) for the issuance of such patent to him, or by any notice previously given by the Administrator stating that he had no objection to the issuance of such patent to the applicant therefor.

[(f) Under such regulations in conformity with this subsection as the Administrator shall prescribe, he may waive all or any part of the rights of the United States under this section with respect to any invention or class of inventions made or which may be made by any person or class of persons in the performance of any work required by any contract of the Administration if the Administrator determines that the interests of the United States will be served thereby. Any such waiver may be made upon such terms and under such conditions as the Administrator shall determine to be required for the protection of the interests of the United States. Each such waiver made with respect to any invention shall be subject to the reservation by the Administrator of an irrevocable, nonexclusive, nontransferrable, royalty-free license for the practice of such invention throughout the world by or on behalf of the United States or any foreign government pursuant to any treaty or agreement with the United States. Each proposal for any waiver under this subsection shall be referred to an Inventions and Contributions Board which shall be established by the Administrator within the Administration. Such Board shall accord to each interested party an opportunity for hearing, and shall transmit to the Administrator its findings of fact with respect to such proposal and its recommendations for action to be taken with respect thereto.

[(g) The Administrator shall determine, and promulgate regulations specifying, the terms and conditions upon which licenses will be granted by the Administration for the practice by any person (other than an agency of the United States) of any invention for which the Administrtor holds a patent on behalf of the United States.

[(h) The Administrator is authorized to take all suitable and necessary steps to protect any invention or discovery to which he has title, and to require that contractors or persons who retain title to

inventions or discoveries under this section protect the inventions or discoveries to which the Administration has or may acquire a license of use.]

SEC. 305. (a) Each contract or other arrangement entered into by the Administration, and each subcontract at all tiers thereunder, which has as one of its purposes the performance of experimental, developmental, or research work, shall contain provisions prescribed by the Administrator governing the disposition of the rights to inventions conceived or first actually reduced to practice thereunder in a manner calculated to protect the public interest and the equities of the contractor.

(b) The Administrator or his designee may, whenever the contract provides for the vesting of title to an invention in the United States, waive the rights of the United States to such invention on such terms and conditions as he determines to be in the best interest of the United States: Provided, That any such waiver shall be subject to the reservation of an irrevocable, nonexclusive, nontransferable, royalty-free license for the practice of such invention throughout the world by or on behalf of the United States or any foreign government pursuant to any treaty or agreement with the United States.

(c) The Administrator may waive, upon the same terms as provided in subsection (b) of this section, all or any part of the rights of the United States to inventions made in the performance of any work under any contract heretofore entered into by or for the Administration which have become the exclusive property of the United States. Any contract heretofore entered into by or for the Administration, on which final payment has not been made, may be amended without consideration to effectuate the purposes of this section: Provided, That no such amendment shall affect the status of inventions which have become the exclusive property of the United States.

[(i)] *(d)* The Administration shall be considered a defense agency of the United States for the purpose of chapter 17 of title 35 of the United States Code.

[(j) As used in this section—

[(1) the term "person" means any individual, partnership, corporation, association, institution, or other entity;

[(2) the term "contract" means any actual or proposed contract, agreement, understanding, or other arrangement, and includes any assignment, substitution of parties, or subcontract executed or entered into thereunder; and

[(3) the term "made", when used in relation to any invention, means the conception or first actual reduction to practice of such invention.]

CONTRIBUTIONS AWARDS

SEC. 306. (a) Subject to the provisions of this section, the Administrator is authorized, upon his own initiative or upon application [of any person], to make a monetary award, in such amount and upon such terms as he shall determine to be warranted, to any [person (as defined by section 305)] *individual, partnership, corporation, association, institution, or other entity* for any scientific or technical contribution to the Administration which is determined by the Administrator to have significant value in the conduct of aeronautical and space activities. Each application made for any such award shall be referred to [the] *an* Inventions and Contributions Board *which shall*

be established [under section 305 of this Act] *by the Administrator within the Administration.* Such Board shall accord to each such applicant an opportunity for hearing upon such application, and shall transmit to the Administrator its recommendation as to the terms of the award, if any, to be made to such applicant for such contribution. In determining the terms and conditions of any award the Administrator shall take into account—

(1) the value of the contribution to the United States;

(2) the aggregate amount of any sums which have been expended by the applicant for the development of such contribution;

(3) the amount of any compensation (other than salary received for services rendered as an officer or employee of the Government) previously received by the applicant for or on account of the use of such contribution by the United States; and

(4) such other factors as the Administrator shall determine to be material.

(b) If more than one applicant under subsection (a) claims an interest in the same contribution, the Administrator shall ascertain and determine the respective interests of such applicants, and shall apportion any award to be made with respect to such contribution among such applicants in such proportions as he shall determine to be equitable. No award may be made under subsection (a) with respect to any contribution—

(1) unless the applicant surrenders, by such means as the Administrator shall determine to be effective, all claims which such applicant may have to receive any compensation (other than the award made under this section) for the use of such contribution or any element thereof at any time by or on behalf of the United States, or by or on behalf of any foreign government pursuant to any treaty or agreement with the United States, within the United States or at any other place;

(2) in any amount exceeding $100,000, unless the Administrator has transmitted to the appropriate committees of the Congress a full and complete report concerning the amount and terms of, and the basis for, such proposed award, and thirty calendar days of regular session of the Congress have expired after receipt of such report by such committees.

APPROPRIATIONS

SEC. 307. (a) There are hereby authorized to be appropriated such sums as may be necessary to carry out this Act, except that nothing in this Act shall authorize the appropriation of any amount for (1) the acquisition or condemnation of any real property, or (2) any other item of a capital nature (such as plant or facility acquisition, construction, or expansion) which exceeds $250,000. Sums appropriated pursuant to this subsection for the construction of facilities, or for research and development activities, shall remain available until expended.

(b) Any funds appropriated for the construction of facilities may be used for emergency repairs of existing facilities when such existing facilities are made inoperative by major breakdown, accident, or other circumstances and such repairs are deemed by the Administrator to be of greater urgency than the construction of new facilities.

INDEMNIFICATION

SEC. 308. (a) With the approval of the Administrator, or his designee, any contract of the Administration for research or development, or both, may provide that the United States will indemnify the contractor against either or both of the following, but only to the extent that they arise out of the direct performance of the contract and to the extent not compensated by insurance or otherwise:

(1) Claims (including reasonable expenses of litigation or settlement) by third persons, including employees of the contractor, for death, bodily injury, or loss of or damage to property, from a risk that the contract defines as unusually hazardous.

(2) Loss of or damage to property of the contractor from a risk that the contract defines as unusually hazardous.

(b) A contract, made under subsection (a), that provides for indemnification must also provide for—

(1) notice to the United States of any claim or suit against the contractor for the death, bodily injury, or loss of or damage to property; and

(2) control of or assistance in the defense by the United States, at its election, of that suit or claim.

(c) No payment may be made under subsection (a) unless the Administrator, or his designee, certifies that the amount is just and reasonable.

(d) Upon approval by the Administrator, payments under subsection (a) may be made from—

(1) funds obligated for the performance of the contract concerned;

(2) funds available for research or development, or both, and not otherwise obligated; or

(3) funds appropriated for those payments.

COORDINATION AND COOPERATION

SEC. 309. (a) Nothing in this Act shall preclude the Department of Defense from undertaking such activities involving the utilization of space as may be necessary for the defense of the United States, including the development of weapons systems utilizing space vehicles and the conduct of supporting research connected therewith.

(b) In order to accomplish the most efficient utilization of resources, responsibility for the development of each new launch vehicle, whether intended for use by the Administration or the Department of Defense or both, shall be assigned by the President to either the Administration or the Department of Defense.

(c) The Administration and the Department of Defense shall advise and consult with each other on all matters within their respective jurisdictions relating to activities involving the utilization of space and research and development connected therewith and shall keep each other fully and currently informed with respect to such activities.

(d) If the Secretary of Defense concludes that any request, action, proposed action, or failure to act on the part of the Administrator is adverse to the responsibilities of the Department of Defense, or the Administrator concludes that any request, action, proposed action, or failure to act on the part of the Department of Defense is adverse to the responsibilities of the Administration, and the Administrator and the Secretary of Defense

are unable to reach an agreement with respect thereto, either the Administrator or the Secretary of Defense may refer the matter to the President for his decision.

Section 799 of Title 18, United States Code

§ 799. Violation of regulations of National Aeronautics and Space Administration.

Whoever willfully shall violate, attempt to violate, or conspire to violate any regulation or order promulgated by the Administrator of the National Aeronautics and Space Administration for the protection or security of any laboratory, station, base or other facility, or part thereof, or any [aircraft, missile, spacecraft, or similar] *aeronautical or space* vehicle, or part thereof, or other property or equipment in the custody of the Administration, or any real or personal property or equipment in the custody of any contractor under any contract with the Administration or any subcontractor of any such contractor, shall be fined not more than $5,000, or imprisoned not more than one year, or both.

TEXT OF ACT OF APRIL 29, 1941, AS AMENDED (40 U.S.C. 270e)

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, The Secretary of the Army, the Secretary of the Navy, the Secretary of the Air Force, *the Administrator of the National Aeronautics and Space Administration,* or the Secretary of the Treasury may waive the Act of August 24, 1935 (49 Stat. 793), with respect to cost-plus-a-fixed fee and other cost-type contracts for the construction, alteration, or repair of any public building or public work of the United States and with respect to contracts for the manufacturing, producing, furnishing, construction, alteration, repair, processing, or assembling of vessels, aircraft, munitions, materiel, or supplies of any kind or nature for the Army, Navy, Air Force, *National Aeronautics and Space Administration,* or Coast Guard, respectively, regardless of the terms of such contracts as to payment or title.

The CHAIRMAN. This morning and tomorrow morning, we will hear from National Aeronautics and Space Administration witnesses who will explain the reasons for the legislation and precisely what they expect it to accomplish.

Our leadoff witness this morning is Dr. T. Keith Glennan, Administrator of the National Aeronautics and Space Administration.

Dr. Glennan, I notice that you have a prepared statement to make to the committee. We will appreciate your proceeding with that statement.

Dr. GLENNAN. Thank you, Mr. Chairman and members of the committee.

Before presenting this statement, I would like to join your committee, collectively, in expressing our appreciation in NASA for the very fine work that was done by Congressman Mitchell and his subcommittee on the inventions matter.

I have consistently heard from our General Counsel, Mr. Johnson, who is with me today, of the very excellent hearings that went on before the committee and we are grateful.

I would like, too, if I may, to suggest that my letter to the Speaker, dated January 14, forwarding the draft of the bill, be made a part of the record of this hearing.

The CHAIRMAN. There being no objection, it is so ordered.

(The document referred to above is as follows:)

JANUARY 14, 1960.

Hon. SAM RAYBURN,
Speaker of the House of Representatives.

DEAR MR. SPEAKER: There is forwarded herewith a draft of a bill "to amend the National Aeronautics and Space Act of 1958, as amended, and for other purposes."

It is recommended that this proposal be enacted by the Congress.

INTRODUCTION

The purposes of NASA's legislative proposals are: (1) To clarify NASA's responsibility for planning and managing a program of nonmilitary space activities and to simplify organizational arrangements relating to such activities; (2) to modify the provisions of the National Aeronautics and Space Act of 1958 concerning property rights in inventions; (3) to provide NASA with certain types of authority which are otherwise available to the Department of Defense or other agencies of the executive branch, and (4) to make certain technical amendments to the act.

In the following discussion, the various items of proposed legislation are grouped under captions which correspond to the foregoing purposes. In general, the proposals are discussed under each caption in the order in which they appear in the bill, and this in turn is based upon the order of the provisions of the act.

CLARIFICATION OF RESPONSIBILITIES AND CHANGES IN ORGANIZATION

On January 14, 1960, the President submitted a special message to the Congress requesting enactment of amendments to the National Aeronautics and Space Act of 1958 to clarify responsibilities and simplify organizational arrangements concerning the nonmilitary space activities of the Government. The President asked that the act be amended to accomplish the following:

(1) To set forth clearly that responsibility for planning and directing nonmilitary space activities is placed directly and unequivocally in one agency, NASA;

(2) To repeal the statutory provisions imposing planning and supervisory duties in connection with aeronautical and space activities upon the President, and to eliminate the National Aeronautics and Space Council;

(3) To eliminate the Civilian-Military Liaison Committee; and

(4) To enact safeguards against undesirable duplication by NASA and the Department of Defense in developing the major tools of space exploration, the launch vehicles which are used to propel and guide spacecraft into an orbit about the earth or toward other celestial bodies.

The President also pointed out that nothing in the act should derogate from the authority of the Department of Defense, which is derived from sources outside the act, to conduct research and development work on space-related weapons systems and to utilize space for defense purposes. Finally, the President stated his desire that there be retained in the act the present provision which authorizes the Administrator of NASA and the Secretary of Defense to refer to the President for decision those matters concerning their respective areas of responsibility on which they are unable to reach agreement.

The President informed the Congress that he was instructing the Administrator of NASA to transmit to the Congress draft legislation incorporating his recommendations. Subsections (1), (2), (3), (4), (6)(B), (7), (9)(b), and (14) of the first section of the proposed bill are designed to give effect to those recommendations.

Amendments to section 102 of the act

In accordance with the President's recommendations, subsections (1)(A) and (1)(B) of the first section of the proposed bill amend section 102 of the act to make it clear that the principal subject matter of the act is the organization, management, and objectives of the Nation's nonmilitary space activities. The proposal eliminates the broad term "aeronautical and space activities" from this section and defines the responsibility of NASA in a new subsection 102(c) as "the exploration, scientific investigation, and utilization of space for peaceful purposes." With these amendments, it is no longer necessary to include any reference to the responsibilities of the Department of Defense in this section of the act, nor is there any reason for providing, as subsection 102(b) now does, that the President shall determine which agency, NASA or the Department of Defense, shall be responsible for a specific activity.

The proposal provides that the general welfare and security of the United States require that adequate provision be made for the exploration, scientific investigation, and utilization of space for peaceful purposes, and for research into problems of flight within and outside the Earth's atmosphere; and it directs that such activities be conducted so as to contribute toward the objectives presently set forth in subsection 102(c) of the act.

The proposed amendments would serve to clarify the purpose of the act and simplify its administration.

Amendments to section 103 of the act

Subsection (2) of the first section of the proposed bill amends section 103 of the act by deleting the definitions of "aeronautical and space activities" and "aeronautical and space vehicles" and substituting new definitions of "spacecraft," "launch vehicles," "space vehicles," and "aeronautical vehicles."

The present definitions will no longer be useful if other sections of the act are amended as proposed. The new definitions are self-explanatory. It is to be noted that the term "spacecraft" does not appear anywhere else in the proposed amendments to the act, but its definition is required in order to give a precise definition to the new term "launch vehicle" which appears in the proposed new section 309 of the act.

Repeal of section 201 of the act and change of heading of title II

Subsections (3) and (4) of the first section of the proposed bill change the heading of title II and repeal section 201 of the act. In his special message to the Congress, the President stated his reasons for recommending deletion of those provisions of the act which impose planning and supervisory duties upon the President and which reflect the concept of a single program embracing military as well as nonmilitary space activities. The President also pointed out that repeal of the statutory enumeration of Presidential duties in subsection 201(e) of the act would entail elimination of the National Aeronautics and Space Council, since its only function is to advise the President in the performance of those duties.

As stated in the President's message, we have come to the end of a transitional period during which responsibilities for a broad range of activities were being shifted to NASA from the Department of Defense and NASA's capabilities for discharging those responsibilities were being developed. It should now be made clear that NASA, like the Department of Defense in the military field, is responsible in the first instance for the formulation and execution of its own program, subject always to the authority and direction of the President.

Amendments to subsection 203(a) of the act

Subsection (6)(B) of the first section of the proposed bill amends subsection 203(a) of the act to set forth a more specific and informative statement of NASA's duties. The words "plan, direct, and conduct aeronautical and space activities" which now appear in subsection 203(a)(1) would be replaced by separate statements concerning NASA's responsibility for the conduct of research into problems of flight and its responsibility for conducting such activities as may be required for the exploration, scientific investigation, and utilization of space for peaceful purposes, including the development of space vehicles for use in such activities. So amended, subsection 203(a) would contain a complete and unambiguous description of NASA's mission.

Repeal of section 204 of the act

Subsection (7) of the first section of the proposed bill repeals section 204 of the act. The President has stated the reasons for eliminating the Civilian-Military Liaison Committee in his special message to the Congress. While the proposed bill would repeal section 204 in its entirety, subsections 204(b) and 204(c) would be substantially reenacted as subsections (c) and (e) of the proposed new section 309. Thus the act would continue to require that NASA and the Department of Defense advise and consult and keep each other fully and currently informed with respect to space activities and related research and development within their respective jurisdictions. The act would also continue to provide that the Administrator of NASA and the Secretary of Defense may refer to the President for decision those matters concerning their respective areas of responsibility on which they are unable to reach agreement.

Amendment of section 206 of the act

Subsection (9)(B) of the first section of the proposed bill repeals subsections 206(b) and 206(c) of the act, thus eliminating the requirement for an annual Presidential report to the Congress covering the entire field of aeronautics and space activities. Since the other amendments discussed above would make it clear that the subject matter of the act is primarily the Nation's civilian program for space exploration and not the entire field of aeronautics and space activities, and since it is intended that NASA be directly responsible for managing such a program, the periodic reports which NASA is required by subsection 206(a) of the act to submit to the President for transmittal to the Congress will keep the Congress fully informed. The annual message of the President on the state of the Union and the annual submittal of legislative proposals also serve the same purposes intended by subsections 206(b) and 206(c). Accordingly, the requirement for a separate report by the President each January on the field of aeronautics and space activities and proposed legislation relating thereto should be eliminated as unnecessary.

Addition of a new section 306 to the act

Subsection (14) of the first section of the proposed bill adds a new section 309 to the act. In addition to subsections (c) and (d) which are derived from subsections 204(b) and 204(c) of the act, it contains a provision in subsection (a) making it clear that the Department of Defense is not precluded by anything in the act from undertaking such activities involving utilization of space as may be necessary for the defense of the United States, including the development of weapons systems utilizing space vehicles and the conduct of supporting research connected therewith. It also provides in subsection (b) that the President shall assign responsibility for the development of each new launch vehicle, regardless of its intended use, to either NASA or the Department of Defense. As stated by the President in his special message, such a provision will provide a safeguard against undesirable duplication by NASA and the Department of Defense in developing the major tools of space exploration. Although a civilian space exploration program is clearly distinguishable from the military utilization of space for defense purposes, both NASA and the Department of Defense may have similar or identical requirements for launch vehicles.

PROPERTY RIGHTS IN INVENTIONS

Subsection (11) of the proposed bill repeals section 305 of the act and enacts in its place provisions which will give NASA a greater measure of discretionary authority concerning the disposition of property rights in inventions conceived or first actually reduced to practice under NASA contracts calling for experimental, developmental, or research work. The purpose of this proposal is to enable NASA to adopt patent policies and practices which appear, after careful study and experience, to be best suited to its needs. The National Aeronautics and Space Act of 1958 was intended to foster a vigorous program of aeronautical and space activities and to preserve thereby the role of the United States as a leader in aeronautical and space science and technology. It is believed that NASA's ability to achieve these objectives would be enhanced by the proposed revision of section 305.

At the present time NASA is required by section 305 of the act, upon the determination of certain facts by the Administrator, to take title to inventions made in the performance of its contracts, unless the Administrator determines that the interests of the United States would be served by waiver of all or any part

of the Government's rights. It is clear that the law in this form recognizes that the Government's objectives in the field of aeronautical and space activities do not require Government ownership of every invention made under NASA contracts. Yet the emphasis on taking title imposes restraints which prevent NASA from contracting for lesser rights in inventions made by contractors where the interests of the Government do not require acquisition of title.

It is well known that NASA's contractors by and large are from the same segments of American industry which do most of the contracting with the Department of Defense in defense aspects of the aeronautics and space field. In most cases, in fact, not only the same industrial units are involved, but essentially the same technology forms the basis for both NASA and Department of Defense contracts. Often contracts are jointly sponsored. Since the practice required by the present law differs from that of the Department of Defense, the disposition of patent rights in inventions under contracts which are basically similar and often with the same contractors, may depend solely upon whether the source of funds is NASA or Department of Defense appropriations. From an equitable as well as an administrative standpoint, it is believed that the Government ought to deal equally, regardless of the agency involved, with contractors engaged in substantially similar work. To this end, in almost every procurement aspect except patents, NASA has the same legal authority and has adopted the same policies and practices as the Department of Defense in conducting its business with contractors. The single exception concerning property rights in inventions, however, is of the utmost importance to contractors. It is therefore necessary, to assure itself of the continuing willingness of contractors to participate in projects of great national importance, that NASA be given discretionary authority to adopt contractual patent provisions in line wih those of the Department of Defense where necessary to meet the equities of the situation.

The Atomic Energy Act, on the other hand, requires that "any invention or discovery, useful in the production or utilization of special nuclear material or atomic energy, made or conceived under any contract, arrangement, or other relationship with the Commission" shall be deemed to have been made by the Commission, except that the Commission may waive its claim to any such invention or discovery. This statutory standard is also at variance with section 305(a) of the NASA Act. If the proposed legislation were enacted, it would enable NASA to adopt patent provisions in its contracts identical with those of the Atomic Energy Commission in cases where the production or utilization of special nuclear material or atomic energy is involved.

The merits of both the title and the license approaches to the so-called "Government patent problem" are under study by the Congress and agencies of the executive branch. Nevertheless, NASA believes that a governmental interest more proximate than the ultimate solution of that question is here involved. Regardless of the agency concerned, the Government ought to deal equally with contractors engaged in substantially identical work. Accordingly, NASA should be able to do its contracting in accordance with the patent policies of the Department of Defense or the Atomic Energy Commission or any other agency of Government when the procurement situation and the interests of the Government require it.

The suggested amendment is substantively like the legislation enacted in 1950 for the National Science Foundation (40 U.S.C. 1871). The principle of that legislation is to authorize the adoption of contract provisions, taking either title or license, whichever will protect the public interest and the equities of contractors.

It should be noted that in those situations where special governmental considerations require, NASA, like the Department of Defense, would still have the authority to acquire title to contractors; inventions. In this connection, two special features of the existing law are carried over in the proposed legislation. First, where the Administrator has acquired or will acquire title to an invention pursuant to a contract, he is given authority to waive the rights of the United States in that invention, retaining an appropriate license for the Government. Secondly, the license retained in these circumstances is to be held not only on behalf of the United States, but also on behalf of any foreign government having a treaty or agreement on the matter with the United States.

It should also be noted that paragraph (d) of the proposed legislation carries over the provision in subsection (i) of the present section 305, which enables NASA to carry out the purposes of the Invention Secrecy Act (35 U.S.C. 151).

NEW AUTHORITY

Authority to "out-lease" for nonmonetary consideration

Subsection (6) (D) of the first section of the proposed bill amends subsection 203(b) (3) of the act to provide authority to enter into leases of Government property for other than a monetary consideration. The amendment employs the same language used in 10 U.S.C. 2667(b) (5) and would provide NASA with the same kind of authority as is available to the military departments. As a case in point, it was once proposed by a group of local citizens that the areas around the runway of the NASA airport at Chincoteague, Va., be leased to them for agricultural purposes in consideration for their keeping the growth close cropped for the benefit of users of the runway, principally NASA. Their proposal could not be entertained, since NASA had no authority to accept other than a monetary consideration for a lease.

Authority to settle claims for past infringement of patents

Subsection (6) (F) of the first section of the proposed bill amends subsection 203(b) of the act to provide authority to settle claims against the Government for past infringment of patents. The military departments now enjoy the authority to settle such claims without imposing upon the claimant the necessity of litigation (10 U.S.C. 2386). NASA has no adequate authority to settle such claims. Subsection 203(b) (13) of the act, giving authority to settle tort claims up to $5,000, is inadequate because of the dollar limitation; and subsection 203(b) (3), authorizing the purchase of patent rights, cannot be utilized to effect a settlement for past infringements if no subsequent use of the patent is involved. The proposed amendment would cover both full and partial settlements, both direct and contributory infringement, and would provide authority identical to that available to the military departments.

Authority to indemnify contractors against unusually hazardous risks

Subsection (13) of the first section of the proposed bill adds a new section 308 to the act, the purpose of which is to grant to NASA authority to indemnify contractors and subcontractors, within certain limits, against risks defined as unusually hazardous. Potentially disastrous liabilities and losses may arise from activities involving applications of atomic energy, the use of high-potency propellants, the development, testing, and operation of space vehicles, and a whole range of novel undertakings on the fringe of the unknown. Such risks arise solely because of governmental activities. This fact makes it incumbent upon the Government to recognize the possible consequences of its activities and to make adequate provision for them.

At the beginning of this session of Congress, NASA requested legislation in a more comprehensive form (H.R. 4148, 86th Cong.), to provide authority for the indemnification of contractors and subcontractors against unusually hazardous risks. At the same time, the Department of Defense requested substantially identical legislation (S. 2110, 86th Cong.). The Department of Defense's request was motivated by the need for authority to indemnify contractors engaged in production in addition to those engaged in research and development. The Department of Defense has had authority to indemnify research and development contractors since 1952 (10 U.S.C. 2354). Neither the NASA bill nor the Department of Defense bill was given serious consideration at the last session. It appears that NASA will not be able to obtain the authority requested last year until the Department of Defense proposal is favorably considered by the Armed Services Committees.

The same need which supported the earlier proposal supports the present proposal which is more limited in scope. The present authority available to the military departments, although confined to research and development contracts in 10 U.S.C. 2354, would go a long way toward solving NASA's problems. Accordingly, the present proposal is intended to give NASA the same legal authority as the military departments now enjoy, pending further consideration of the larger problem by the Congress.

Authority to waive performance and payment bonds

Section 3 of the proposed bill amends the "Miller Act" (40 U.S.C. 270a–270e) to provide NASA with authority to waive performance and payment bonds otherwise required of Government contractors on construction work. The proposed amendment would give NASA legal authority identical to that of the military departments and the Coast Guard. It would tend to conserve NASA's

appropriation to a slight degree. As a case in point, NASA has a cost-type contract with a large, responsible company which calls for the construction of tracking facilities. A military department would be able to waive performance and payment bonds in a case of this type where the financial responsibility of the contractor appears to warrant it and thus save the Government several thousand dollars, but NASA is precluded from doing so because of the lack of legal authority.

TECHNICAL AMENDMENTS

Amendment to paragraph 203(b)(6) of the act

Subsection (6)(E) of the first section of the proposed bill amends subsection 203(b)(6) of the act to provide clarification of the authority of other agencies acting in cooperation with NASA. The proposed amendment specifically authorizes other agencies of Government to obtain items for NASA by entering into a contract for such items. Although NASA interprets the present statutory provision as including the authority to enter into such contracts, the additional phrase is proposed to preclude any question from being raised by another agency.

Amendments to subsection 304(b) of the act

Subsection (10)(A) of the first section of the proposed bill amends subsection 304(b) of the act to correct what appears to have been an unintentional omission. The proposed amendment adds the phrase "or designee thereof" after the reference to "the Administrator" in connection with authorizing access to restricted data relating to aeronautical and space activities on condition that such access is required in the performance of duty and so certified by the Administrator. The making of these certifications is a routine function which should be delegable by the Administrator to security officers and others in accordance with the normal practice of the Atomic Energy Commission, the Department of Defense, and NASA.

Subsection (10)(B) of the first section of the proposed bill amends subsection 304(b) of the act to delete reference to the National Aeronautics and Space Council from the security provisions of the act. The proposed amendment is a necessary consequence of repealing section 201 of the act.

Amendment to subsection 306(a) of the act

Subsection (12) of the first section of the proposed bill amends subsection 306(a) of the act to include authority for establishment of an Inventions and Contributions Board. The proposed amendment is a necessary consequence of repealing subsection 305(f) of the act which presently contains authority for establishment of such a Board. Moreover, it is appropriate that the section of the act dealing with functions of the Board should also contain the authority for its establishment.

Amendment of 18 U.S.C. 799

Section 2 of the proposed bill amends section 799 of title 18 of the United States Code to substitute for the words "aircraft, missile, spacecraft, or similar vehicle" the more comprehensive term "aeronautical or space vehicle." Title 18, United State Code, section 799, provides criminal penalties for violations of regulations or orders promulgated by the Administrator of NASA for the protection or security of property and equipment. The proposed amendment is required to conform to the definition contained in the proposed amendment to section 103 of the act.

Renumbering of sections

Subsections (5), (6)(A), (6)(C), (8), (9)(A), and (9)(C) change certain numbers and captions in the act as the necessary consequence of other amendments.

BUDGETARY SIGNIFICANCE

Enactment of the foregoing legislative proposals would cause no increase in budgetary requirements of the National Aeronautics and Space Administration. The Bureau of the Budget has advised that there is no objection to the presentation of this proposal for the consideration of the Congress.

Sincerely yours,

T. KEITH GLENNAN, *Administrator.*

Enclosures:

1. Draft of bill.
2. Sectional analysis.

STATEMENT OF DR. T. KEITH GLENNAN, ADMINISTRATOR, NASA; ACCOMPANIED BY DR. HUGH L. DRYDEN, DEPUTY ADMINISTRATOR, NASA; AND JOHN A. JOHNSON, GENERAL COUNSEL, NASA

Dr. GLENNAN. Then I will proceed. I welcome this opportunity to discuss the President's proposed amendments to the National Aeronautics and Space Act of 1958 which were submitted in a special message to the Congress on January 14, 1960.

In proposing these amendments for congressional enactment, the President is taking cognizance of NASA's coming of age after a very active transitional period during which our capabilities have been developed and expanded and our goals have come more sharply into focus. The amendments are a natural evolution based upon operating experience under the present law.

Principally, the amendments would accomplish the following:

(1) Make clear NASA's unequivocal responsibility for planning and carrying out the Nation's space exploration program;

(2) Eliminate presently unnecessary organizational elements;

(3) Provide adequate safeguards against unnecessary duplication of effort by NASA and the Department of Defense, particularly in the costly field of launch vehicle development; and

(4) Provide for a clearer realization, both in this country and throughout the world, that the United States has a single space exploration program administered by NASA. Such military operations in the space environment as may be necessary for our national defense devolve from the responsibilities of the Defense Department for the defense of the Nation and clearly must be managed by the Department of Defense.

The Space Act, as you know, requires that the President supervise a so-called comprehensive program. In no other aspect of Government does the Chief Executive have such an immediate degree of responsibility for an operating program.

To assist the President in these duties, the act presently provides him with an advisory body, the National Aeronautics and Space Council, of which he is Chairman. The 1958 legislation also set up a Civilian-Military Liaison Committee to provide a channel through which NASA and the Defense Department shall—in the language of the act "advise and consult" on all matters within their respective jurisdictions as they relate to aeronautics and space.

Under the original act, and under the act as the President has recommended that it be changed, only two Government agencies have management responsibility in the area of space activities—NASA and the Department of Defense. Numerous other agencies contribute vital elements to both NASA and Defense projects. When all the nondecisionmaking bodies with which we deal are reduced to a chart, the resultant tangle of boxes and dotted lines gives an impression of confusion and divided authority, but such is not the case. Only NASA and the Defense Department have clear management responsibilities.

I have emphasized this last point because there has been considerable misunderstanding and criticism of the Government for having "too many fingers in the space pie."

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Let me here quote the President's message of January 14, and I am quoting:

> * * * In actual practice, a single civil-military (space) program does not exist and is, in fact, unattainable; and the statutory concept of such a program has caused confusion. The military utilization of space, and the research and development directed toward that end, are integral parts of the total defense program of the United States.
>
> * * * The Department of Defense has ample authority outside the * * * act * * * to conduct research and development work on space-related weapons systems and to utilize space for defense purposes; and nothing in the act should derogate from that authority * * *

Pointing out that we have come to the end of a formative period during which responsibility for a broad range of space activities shifted, as authorized in the act, from Defense to NASA, the President said:

> From now on it should be made clear that NASA, like the Department of Defense in the military field, is responsible in the first instance for the formulation and execution of its own program, subject, of course, to the authority and direction of the President.

With repeal, therefore, of the specific statutory enumeration of the President's duties, he consequently requests abolition of the National Aeronautics and Space Council which had the sole duty of advising him on those duties. He also calls for abolition of the Civilian-Military Liaison Committee which has, in practice, served as only one of many channels of communication between NASA and the Pentagon. In order to coordinate activities and prevent duplication of effort and expense, it is imperative that NASA-Defense liaison be conducted at many levels. The attempt to formalize this need and center the activity in one committee has proven to be an unnecessary, cumbersome, and unworkable mechanism.

The act would retain the provision that in case of serious disagreement between NASA and Defense over roles and missions, use of launch vehicles or whatever, the NASA Administrator and the Secretary of Defense would take them to the President for his final decision.

In the single most important area requiring coordination between NASA and Defense, the President requests that the act embody a procedure whereby he assigns responsibility for development of new launch vehicles—regardless of which agency has the prime requirement for their use in space missions.

In this connection, as you know, the President sent a second message on January 14, advising the Congress of his intention to transfer the Development Operations Division of the Army Ballistic Missile Agency to NASA along with Saturn, the superbooster under development by that Division, it being clear that there is no immediate military mission for such a launch vehicle. We have been encouraged by the prompt action of this committee and the House of Representatives in endorsing this transfer.

By way of summary: If enacted, the proposed amendments would make absolutely clear NASA's responsibility for the Nation's space exploration program and eliminate the present specific statutory duties of the Chief Executive in this regard. The NASA would be clearly answerable to the President and the Congress, just as the Defense Department has unquestioned responsibility for defense-

related space activities and also is responsible to the President and the Congress.

NASA and Defense will continue, as at present, to cooperate closely at all levels. Undoubtedly, each program will continue to produce hardware, techniques, and scientific data useful to the other.

The President's requested amendments also include such technical changes as modification of certain provisions of the act concerning invention property rights. The modification of the patent clauses in the legislation would give NASA adequate discretionary authority concerning an equitable disposition of property rights relating to inventions produced under NASA contracts. The President has included several other proposals which will place NASA on parity with the Defense Department in dealing with contractors and in other business activities.

As you consider these amendments, I would like to review briefly with you the course of events since the evening of October 4, 1957, when the news of Sputnik I burst upon the world. More than 2 years have passed since that evening but we are still conscious of the turmoil that followed in its wake.

Sputnik arrived in the middle of an annual domestic crisis—the World Series. And while some of our citizens remained momentarily more interested in the trajectory of baseball than in the satellite's orbital flight, the Soviet accomplishment hit most thinking Americans like a dash of cold water.

The Nation began a rexamination of U.S. science, defense, education, and foreign policy that is still going strong. Out of this ferment of congressional hearings and national debate came the firm resolve of both the executive and legislative branches that a civil agency should be established to conduct the Nation's space exploration program.

The President appointed Dr. James R. Killian as his Special Assistant for Science and Technology and as Chairman of his Science Advisory Committee. This distinguished group prepared the first general outlines of a national space program and listed the following four factors involved therein:

> The first of these factors is the compelling urge of man to explore and to discover, the thrust of curiosity that leads men to try to go where no one has gone before.
>
> Second, there is the defense objective for the development of space technology. We wish to be sure that space is not used to endanger our security. If space is used for military purposes, we must be prepared to use space to defend ourselves.
>
> Third, there is the factor of national prestige. To be strong and bold in space technology will enhance the prestige of the United States among the peoples of the world and create added confidence in our scientific, technological, industrial, and military strength.
>
> Fourth, space technology affords new opportunities for scientific observation and experiment which will add to our knowledge and understanding of the earth, the solar system, and the universe * * *.

In early April 1958, the President sent a special message to the Congress calling for a civilian space agency. After hearings and debate, the National Aeronautics and Space Act of 1958 was enacted in July and NASA became officially operative on October 1.

The existing act states that, and I quote:

> it is the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all mankind.

It calls upon NASA, in section 203, to—

plan, direct, and conduct aeronautical and space activities—

these being defined in section 103 as—

(1) research into, and the solution of, problems of flight within and outside the earth's atmosphere;
(2) the development, construction, testing and operation for research purposes of aeronautical and space vehicles; and
(3) such other activities as may be required for the exploration of space.

Of the three objectives, only the third is unique to NASA, for the National Advisory Committee for Aeronautics and the armed services were engaged in the first two activities before the creation of NASA.

The exploration of space, then, is NASA's specific mission, and it is a mission for which it is solely and exclusively responsible under the law. This is a responsibility just as unique to NASA as the military defense of the Nation is to the armed services. It is a mission of vital importance to the security interests of the United States.

To provide the newborn agency with the capability to fulfill its mission, the act gave the President authority to transfer to NASA from Defense, projects and organizations which he deemed to be important to the fulfillment of that mission.

You are all familiar with NASA's absorption of NACA and with the transfers of other important activities immediately following establishment of NASA. With the acquisition of the Development Operations Division of the Army Ballistic Missile Agency, NASA will have developed an all-around space capability.

The consolidation of the U.S. space exploration program under NASA has greatly clarified the civilian and defense roles in space. Projects and personnel have been dropping into place like the pieces in a puzzle.

The law, as originally enacted, permitted and encouraged these actions which have had the support of the Congress. The administrative machinery to accomplish this purpose has served well the intention of its authors. Looking ahead to the heavy and continuing responsibilities which face the Nation in this highly competitive field, the President is proposing a straightforward legislative change that gives to NASA the task of meeting these responsibilities.

I respectfully urge the prompt enactment of these amendments.

With me today are several colleagues who will attempt, as will I, to answer any questions you may have.

The CHAIRMAN. Thank you very much, Dr. Glennan, for a fine statement.

Does Dr. Dryden have a statement?

Mr. DRYDEN. No, I do not, Mr. Chairman. I have nothing to add at this time.

The CHAIRMAN. None of the other witnesses have to go to the White House this morning, so we will hear their statements later.

Dr. Glennan, I have listened very attentatively to your statement. You said in one portion of it that there are many channels of communication between NASA and the Pentagon other than the military-civilian liaison committee. What are those channels and why do they exist?

Dr. GLENNAN. These channels, so-called, exist at every level of our organization. In the first instance, in the development of the specifications for projects, more often than not, representatives of the technical services of the Department of Defense will meet with our own engineers and scientists to discuss these programs. As one moves up the organization toward the management responsibilities, the Director of Launch Vehicles is in rather continuous discussions with counterpart organizations in the Department of Defense relating to matters concerning contracting or the use of the pads and other facilities at Cape Canaveral or on the Pacific Missile Range. Mr. Horner, as Associate Administrator, is in reasonably constant touch with Dr. York and the Assistant Secretaries for Research and Development who have responsibilities for the research and development programs of the services.

And, finally, Dr. Dryden and myself have not quite so frequent, but fairly frequent contacts and discussions with the Secretaries of the services and with the Secretary and Deputy Secretary of Defense.

The CHAIRMAN. Now, the program advocates the elimination of the Space Council, to give it a short name. What will take the place of that council after it is eliminated?

Dr. GLENNAN. It is my intention to appoint an advisory committee to the Administrator. This committee might well include some members of the administration. By administration I mean members of the executive branch. And it would include distinguished and able people from activities outside the Government. This committee would serve as an advisory committee to the Administrator, probably dealing more specifically than was possible with the Space Council, with the developing programs, organization, and operations of NASA.

The CHAIRMAN. I think we can say one thing: We all want to see the program of space development proceed more expeditiously; to see the United States overtake and bypass Russia; and I know that the committee would like to put those things into the bill that would help in doing that. Would the changes proposed by your bill take from the Defense Department; that is, the Army, Navy, Air Force, or Department of Defense, Office of the Secretary of Defense, any of the present projects which they have at this time?

Dr. GLENNAN. No, sir; that is not in contemplation.

I think that our agreements with the Defense Department are rather complete now and that with the transfer of the Von Braun group to NASA and the transfer of responsibility for the superboosters, there is no present need for concern about transfers of projects between the two agencies.

The CHAIRMAN. Well, I am sure that you don't propose to give up any of the projects that are now under the jurisdiction of NASA. That is correct; isn't it?

Dr. GLENNAN. That is correct. It should be made clear, however, that should there develop an operational need for a project which is presently under our jurisdiction, I am sure, there would be no difficulty in having the Defense Department work directly with us and finally take over the responsibility for developing the operational system.

The CHAIRMAN. You feel, I judge from what you say, that the matter of research should be in NASA, but that the operations, that is the development of weapons, should be in the Pentagon.

Dr. GLENNAN. It is provided, as you know, Mr. Chairman, in section 309 of the proposed amended act for the Defense Department to continue to develop and to conduct research on systems which are intended for military purposes. The NASA will not compete in that field, although it is clear that the information which may be derived from many of our programs, will be of direct interest and benefit to them and I think the reverse is true. We will gain from the work that the Defense Department is doing with respect to military oriented systems.

The CHAIRMAN. Mr. Fulton?

Mr. FULTON. I appreciate your statement. I think it is an excellent one and I want to compliment both Dr. Glennan and Dr. Dryden on the excellent work they are doing, and with the foresight with which they are approaching these many, many problems. I also compliment NASA as an agency for its work; it is balanced work proceeding along efficient lines.

On the chairman's question going to operations, my position has always been that the United States should approach space for peaceful purposes and through peaceful means. That means that the exploration of space is much broader than simply going from place to place or going to new places or finding out certain distances or loci.

Now, that means that scientific exploration would involve all the characteristics of space, rather than just physical presence and travel. Don't you feel that is the definition?

Dr. GLENNAN. Yes, sir.

Mr. FULTON. If that is the definition, then, NASA will have control of certain expeditions into space which will mean expeditions that may be planetary expeditions and projects for peaceful purposes.

The question then comes: Who controls these expeditions? For example, if such an expedition arrives on the Moon. My solution is that obviously in that particular phase of operations in deep space, beyond the orbital characteristics, for example, of a satellite, NASA would therefore, have the sole responsibility, subject to future legislation, because that is the peaceful purpose and yours is the peaceful instrument and the only one we have in the country. Is that not right?

Dr. GLENNAN. That is right.

Mr. FULTON. So that the question of competition among the various military services in connection with landing the first man on the Moon is one that should not come up, we should never get into that; is that not right?

Dr. GLENNAN. I would say so.

Mr. FULTON. Now if you agree with that, then I have a question.

There is tremendous competition for the glory of who shall be the first man in space. I have always felt that the first man in space in the Mercury program should be a civilian. As you remember, I previously asked why not let the people who are going up in the X-15 have a chance to make the next progression in the Mercury project?

My question is this, and I have a recommendation: Why don't you have each of the astronauts separated from his service so there will be no competition among the Navy, the Air Force, and the Marines as to which will be the first service to send the first man in space? Why shouldn't these people be civilians during the time they are working

with your agency, NASA, and then later if they want to return to the military service, all right?

I think it would be much better if they are treated as scientists and explorers rather than as Navy, Air Force, or Marine Corps personnel. As you know, the Army is left out of it. I happen to be a Navy man so I think our chances are four out of seven of getting into space first. But I think that is the wrong approach.

Why don't you make such a recommendation?

Dr. GLENNAN. Mr. Fulton, we, of course, have thought about these matters.

Actually, the decision as to which man is going to have the first ride will be made by people who, I think, are not going to be concerned with whether it is the Navy or the Marines or the Air Force from which the particular man may have been detailed. The reason for not transferring these men directly to NASA as against assigning them to us, where they now operate as civilians is simply that they will probably go back to their services. That is their career. The act of separating them from their service and making them civilians for these 2 or 3 years, seems really an unnecessary action. We have not had any indication, to my certain knowledge, of inhouse competition, pride of service, in this situation at all. It has gone very well, indeed.

Mr. FULTON. Wouldn't you think it would fit much better into our U.S. policy of approaching space for peaceful purposes through peaceful means if we did not put a servicemen into space first?

Dr. GLENNAN. I think there is validity in that statement.

On the other hand, it is clearly impossible for us to conduct Mercury without the excellent support of the military services. The medical people who are working with us are principally from the services; the recovery task force could be put together only by the Defense Department. So that we would be really making one little shift which I think would not be conclusive evidence that this was a peaceful mission.

We rather prefer to make as certain as we can in all of our statements and in all of our actions that this indeed is an exploration of space and space travel for peaceful purposes.

The CHAIRMAN. Mr. Miller.

Mr. MILLER. Getting back to the bill in question, Dr.——

Dr. GLENNAN. Yes, sir.

Mr. MILLER. Leaving astronauts for a while, doesn't this really mean NASA has now become of age and is willing to accept its full responsibilities as the civilian space agency, and it is no longer necessary to have this board of monitors standing over it?

Dr. GLENNAN. I think that is indeed the case.

Mr. MILLER. I think you make a very good case for it and I want to congratulate you on your statement.

Dr. GLENNAN. Thank you, sir.

Mr. MILLER. And congratulate NASA on the great advancements it is making. That is all, Mr. Chairman.

The CHAIRMAN. Mr. Van Pelt?

Mr. VAN PELT. Doctor, could you or one of the gentlemen with you elaborate a little bit on this one sentence, "Projects and personnel

have been dropping into place like the pieces in a puzzle"? I am familiar with some of them, and with some of them I am not.

Dr. GLENNAN. Mr. Van Pelt, I was intending to say that the transfer of projects which are peaceful in nature from ARPA, or other elements of the military establishment, have been coming under the jurisdiction of NASA sequentially, as one would put a puzzle together and we now think we have this in good shape. We started out at the time of the October 1 announcement that we were in operation, with the transfer of the Vanguard project, followed by the transfer of the Jet Propulsion Laboratory in December, followed by the transfer of the meteorological satellite, responsibility for development of the Centaur upper stage, finally the transfer of the Saturn project, the responsibility for superboosters, and now the proposed transfer of the Development Operations Division of the ABMA to NASA.

There are many other projects that I have not enumerated. But one by one, as it was clearly established that they fitted into a program of space exploration as against the exploitation of space for a military requirement, they have come rather naturally into the orbit of NASA and we have accepted responsibility for them.

Mr. VAN PELT. Fine. Thank you very much. That is all, Mr. Chairman.

The CHAIRMAN. Mr. Sisk?

Mr. SISK. Good morning, Dr. Glennan, and Dr. Dryden.

Dr. GLENNAN. Good morning.

Dr. DRYDEN. Good morning.

Mr. SISK. Dr. Glennan, in attempting to analyze the various amendments that are proposed to the act, let me ask you this general question. Do you feel that the proposed amendments which we have before us would broaden the basic authority of NASA, or do you feel that it would narrow or make more rigid the limitations of NASA's authority?

Dr. GLENNAN. Mr. Sisk, I think really, neither of those statements would describe what we are attempting to do. Rather, the word "clarify" is best used here. We are not attempting to broaden the authority of NASA, we are not attempting to narrow it, we are attempting to clarify both its authorities and responsibilities.

That seems to me the simplest way to put it to you, sir.

Mr. SISK. I am inclined to agree with your statement. I think many of these, probably most of these, are very good suggestions, and yet it would seem to me that through clarification, that it would tend to more clearly define and possibly enlarge to some extent the scope of your responsibility and authority as an agency. Now maybe I am wrong in that. That was the point I was trying to get over as a general question. I am not being critical. Having been a very stanch supporter of this agency and one of the members of the select committee that created it, I want to see the lines very clearly drawn.

For example, with reference to leasing authority, it is proposed that we strike out certain language and add other language: "to lease to others such real and personal property" and so on; I don't have the time to go into this to the extent I would like to. I hope, Mr. Chairman, we will have more time later on. But these seem to broaden the authority of NASA.

Dr. GLENNAN. Yes; I think I understand what you meant. I mistook your question for one relating to: Are we attempting to take a larger area of operating authority?

Mr. SISK. No; I did not mean that, Dr. Glennan.

Dr. GLENNAN. No. In several of these instances that you cite and in the patent clause, there is an attempt to give to the agency the authority to do things that we believe through our experience are necessary for the agency to have. These relate principally to these somewhat technical matters, I think. For instance, we ran into a situation where we were not allowed to lease some land to a farmer on one of our airports in return for his keeping the grass cut and things of that sort. He could grow a crop there and thus save us the money of maintaining the areas outside the runway. One of the amendments would give us the right to make such a lease in view of the normal monetary rental procedure.

Mr. SISK. Let me say that I agree completely with this. I think this is authority you should have. There was no criticism implied.

Dr. GLENNAN. I understand.

Mr. SISK. I am simply trying to examine this. It seems to me that most of the amendments give you a little plainer direction, and I agree with the objectives of clarification and simplification of some of the language.

Dr. GLENNAN. That is right.

Mr. SISK. But it does to some extent broaden your responsibility, and make more clear the direct responsibility which you have.

Now there is one other question: I want to ask you to what extent NASA proposes to set up what you might call a construction division.

To what extent are you proposing to depend, for example, on the Corps of Army Engineers or the Bureau of Yards and Docks as a construction agency? I have some concern about this. Would you take a moment to indicate to what extent you will use present existing agencies for your construction program?

Dr. GLENNAN. Mr. Sisk, we have no present intention of setting up a construction division. Actually, we will not require large, expensive construction in the sense that the Atomic Energy did when they were building their plants.

We, I think, would be inclined to deal almost entirely with private industry in the building of office buildings and laboratories as they might be required, but would certainly not exclude utilizing the services of the Corps of Engineers where this seemed in the best interests of the agency and the Government to do. This might occur, for instance, in connection with the construction of an additional static test stand at the Huntsville Arsenal. It is not clear just how we will accomplish that as yet, but we wouldn't exclude one or the other.

The CHAIRMAN. The gentleman's time has expired. Mr. Riehlman?

Mr. RIEHLMAN. Dr. Glennan, as I understand these amendments, the President would be relieved of some of his responsibilities in respect to your activities and greater responsibility would rest upon your shoulders to carry out the program?

Am I correct in that assumption?

Dr. GLENNAN. You are correct in that assumption, Mr. Riehlman. What it does is to relieve him of a task which he can hardly discharge anyway; the immediate, day by day, direction of the Nation's space program, as it has been called.

Mr. RIEHLMAN. I see.

Now, the President is advised by what is known as the Space Council. What are you going to use in the place of that when this responsibility drops down into your lap?

Dr. GLENNAN. Mr. Riehlman, I recognize that the NASA is going to be charged with and is charged with the expenditure of very large sums of public money and with the undertaking of scientific, technological activities that may well be of very great significance to the future of the Nation.

Under these circumstances, it does seem to me that advice and consultations from a properly constituted advisory group is a desirable thing and it has been in my mind to do just that—appoint a group, advisory to the Administrator on matters of research and operating policy.

Mr. DADDARIO. Would the gentleman yield?

Mr. RIEHLMAN. Yes.

Mr. DADDARIO. How many times has the Space Council met, Doctor?

Dr. GLENNAN. It has met essentially once a month, Mr. Daddario.

Mr. DADDARIO. Since the act has been passed?

Dr. GLENNAN. Yes. I think there was a month or two during the holidays if you would call it that, when the Council did not meet.

Mr. RIEHLMAN. Dr. Glennan, did you serve on that Council?

Dr. GLENNAN. I did, sir.

Mr. RIEHLMAN. Now, the President has the authority to allocate to NASA and to the Defense Department certain projects. The responsibility of NASA in dealing with the military will continue to be of great importance. Now we have the Civilian-Military Liaison Committee for this purpose. Now under the terms of this bill that Committee would be eliminated?

Dr. GLENNAN. That is right, sir.

Mr. RIEHLMAN. How would you operate without this civilian-military liaison group? Would it be a direct liaison activity between you and the Secretary of Defense, or would you have some type of council or group carrying out that function?

Dr. GLENNAN. I would not propose that there be established any formal council or group through which group all correspondence or interchange of views or requirements between NASA and the Defense Department would flow.

This seems to me to be creating nothing but a bottleneck. I get into the discussions with the Secretary of Defense when there is need for a high policy decision. At the operating level, Mr. Horner talks with the people at his commensurate level in the Defense Department and they come to conclusions on operating problems and they do this without reference to the Secretary of Defense and myself, so long as they are operating within the general bounds of the policies on which the two of us may have agreed.

At the technical level, Mr. Riehlman, there is constant interchange. Usually at that level there is an agreement on the technical content of a program. They are not concerned particularly with the policy or

operating decisions. These go back up the line and are handled by Mr. Horner or, in turn, by Dr. Dryden and myself. We find no difficulty in this.

Actually, the concept of an agency or an office between the two agencies seems to me to be really unworkable.

Mr. RIEHLMAN. Suppose there is a disagreement between you and the Secretary of Defense. The decision would then rest with the President; is that correct?

Dr. GLENNAN. If there is a disagreement between the Secretary of Defense and myself as to any matter, we take that to the President.

Mr. RIEHLMAN. Thank you very much.

The CHAIRMAN. Dr. Glennan, it is now a little after 11 o'clock. Please tell us when you have to go. We will proceed with other witnesses after you leave.

Dr. GLENNAN. I think if we could run to about 11:25, we would like to be as responsive as we can.

The CHAIRMAN. All right. I recognize Mr. Mitchell.

Mr. MITCHELL. I am sure there are others who have questions, Mr. Chairman, and I will not ask any.

The CHAIRMAN. Mr. Johnson will be here to answer questions after Dr. Glennan and Dr. Dryden leave. We will go right ahead with the hearing; so don't hesitate to ask any questions you may have.

Mr. MITCHELL. Thank you, Mr. Chairman. Doctor, I think you have stated your case well for these suggested changes. I commend you for your statement, and I want to congratulate Dr. Dryden for the award that you are going to receive this morning.

Dr. DRYDEN. Thank you, sir.

Mr. MITCHELL. That is all, Mr. Chairman.

The CHAIRMAN. Mr. Quigley?

Mr. QUIGLEY. Dr. Glennan, I don't ask you to answer my question today.

Within the last few weeks this committee has had the testimony of two distinguished Americans, both of whom I admire greatly. One was General Medaris and the other was Dr. Pickering. This may be an oversimplification, but to summarize their testimony, I think they said, in effect, that you can consult and communicate and cooperate and coordinate all you want, but eventually, if you are going to get anything done, there has got to be a take-charge type of guy who has the authority to take charge.

Now, at that point the two witnesses differed. The general said the only way this could be done in the space program is with a military man in command.

Dr. Pickering, on the other hand, said that it should be a civilian, and the agency should be NASA.

Would you or someone on your staff go over that testimony and prepare a critique, indicating where you disagree with Dr. Pickering's suggestions and where you disagree with the general's testimony?

I think I would find it quite helpful in trying to resolve these matters.

Dr. GLENNAN. I would be happy to do that, Mr. Quigley, and I think it would be well to take the time, thoughtfully, to outline this for you. I would just say at this point that in the normal democratic

process, each person, I think, is entitled to express his opinions as he will.

Mr. QUIGLEY. The particular point I would like you to consider is this: Would you answer the general's basic contention that a civilian like yourself is really not in a position to do the job the way it has to be done?

Dr. GLENNAN. Surely.

(The information requested will be found on pp. 72–73.)

Mr. QUIGLEY. One other point raised by the gentleman from Pennsylvania: It is small, it almost seems picayune in the whole scheme of things, but I think it is completely valid. It is this kind of little thing that puts us in such a bad light internationally. We have almost made a fetish of our space program being a civilian effort. Yet the fact remains that when we finally get a man in space, the glory is going to go to one individual and he is either going to be a commander-somebody, or a captain-somebody, or a lieutenant-somebody.

On the other hand, I am sure our Russian opposition, with its demonstrated ability in propaganda techniques, is going to use the military effort of the U.S.S.R. to put a man up, and when they put him up there, he is going to be private citizen Slobovitch or some such thing as that, just to demonstrate once more to the peoples of the world that the Russians are a peace-loving people and, of course, that we are military-minded in our approach.

I think it is a very small point, but I think it is completely valid, and while it might involve some redtape and it might jeopardize, to a certain extent, the military careers of the seven astronauts, I think the propaganda points involved are so worthwhile that the men in question ought to be willing to make whatever sacrifice is called for.

Dr. GLENNAN. Let me reexamine that, and perhaps I will communicate with you.

Mr. QUIGLEY. That is all.

Mr. FULTON. I thank you.

The CHAIRMAN. Mr. Hechler.

Mr. HECHLER. Dr. Glennan, as you know, whenever you appeared before this committee, I have been a very stanch advocate of Executive power.

Dr. GLENNAN. Yes, sir. I appreciate it.

Mr. HECHLER. This is the line along which I would like to ask you a few questions. I was a little disturbed at your answers to Mr. Riehlman and the chairman on what would replace the Space Council because in your answers you gave an indication of somebody that would advise NASA, whereas according to section 201(d) of the act, I quote:

> It shall be the function of the Council to advise the President.

Like Mr. Quigley, I am in favor of a "take-charge guy," and want to see if there isn't some way that we could get the President into this act.

Now I realize that what you are trying to do is to relieve the President of certain managerial and operational responsibilities.

Yet, aren't you isolating him here, from the position of leadership which perforce he must have under the American system?

Dr. GLENNAN. I think not, Mr. Hechler.

In the first instance, I report to the President and see him on frequent occasions. Secondly, I am invited to attend at National Security Council meetings when there are matters relating to the work of this agency or thought to relate to the work of this agency.

Further, I meet from time to time with members of the Cabinet to discuss our program, and answer their questions about the program.

Mr. HECHLER. Well, under such an arrangement you are merely reporting. We must somehow or another infuse the aspect of leadership into this. I wonder if you could tell us just what will replace the Space Council so far as keeping the President advised so he can make the decisions and exert the leadership in this field, particularly on the relation between the military and peaceful uses of space, for example?

Dr. GLENNAN. You will recall that in the original act the Space Council was set up to advise the President with respect to his duties which called for a variety of activities. They advised him when they were asked to advise him, as one would expect.

Now, in this sense of advising him of the conduct of the program—what is being done, it seems to me that this devolves upon myself and, on the other side of the Potomac, on the Secretary of Defense.

I would presume we would have meetings with him when these were necessary.

As to a body which is constantly overseeing the work of NASA and reporting this to the President, it seems to me this would be simply interposing a mechanism that could not be very effective.

Actually, the Congress, itself, is a forum in which we find ourselves describing in very great detail the program of the agency and we receive from the Congress constructive criticism that is useful to us.

I fail to see where there is need for a body that would replace the Space Council.

Mr. HECHLER. I just think we are moving into kind of a dangerous period where we are cutting the line between the military and civilian which makes the position of the President so much more important, so far as leadership and coordination are concerned.

I note you say here on page 5, at the end of the third full paragraph:

> The President has included several other proposals which will place NASA on parity with the Defense Department dealing with contractors and other business activities.

I would just like to observe that, using agricultural terminology, I hope that is at least 90 percent of parity and that it is firm. [Laughter.]

Dr. GLENNAN. I hope so, too.

Mr. HECHLER. That is all.

The CHAIRMAN. Mr. Daddario?

Mr. DADDARIO. Dr. Glennan, I frankly don't see too much of an improvement in the amendments that have been suggested. My reasons are somewhat similar to those of Mr. Quigley, I should think. Your agency has certain problems in space, and the military has certain problems in space. And when you say the Department of Defense, I have to divide that into three sections and, therefore, I see four agencies or departments of the Government involved.

I wonder why you aren't demanding that you take charge of the whole space effort, that you take the responsibility, and when you overcome the problems that are preventing us from getting into space, that at that time, you will have the key to what the Army, the Navy, or the Air Force might need.

Why isn't this our best solution? Why don't we have it all under one tent, and why can't you take the responsibility of accomplishing these ends. What compelling military need is there at this moment that makes you say, as you do in your section 4, that there are clearly defense responsibilities that must be managed by the Department of Defense?

I don't consider that a communications satellite or a weather satellite or a navigation satellite or any of these things, have such a priority that they cannot wait until you first get a vehicle that can get out into space. Then these things can be adapted to it?

Dr. GLENNAN. Mr. Daddario, this is apt to lead to a very long answer. I would remind you that the Congress did declare that the policy of the United States is that activities in space are to be devoted to peaceful purposes.

The Congress then said it is obvious there are going to be some military usages of outer space and that those usages should be handled by the Department of Defense.

Were we to assert a claim to the responsibility for conducting all activities in outer space, military as well as civilian, it would seem to me that we would run immediately into such problems as the use of the launch ranges at Canaveral and the Pacific Missile Range; that we would run into problems of the management of a task force, such as the Navy and Air Force are providing for us in the recovery of the Mercury project, supporting the entire project; that in those areas we would be attempting to cut up a body that really is not divisible. We wouldn't want to take a piece of Canaveral and set in our own organization to manage that piece at Canaveral. We would rather buy those services from the military services.

Now, were we to have full responsibility for all activities in space, clearly the military would have the right to place requirements upon us to provide for some of their asserted needs for activities in space.

My conviction is that those requirements would spread over us like an umbrella and that we would soon find that we were conducting, a military-oriented program rather than a program in space exploration, such as the law calls for.

All of this would incline me to say, Mr. Daddario, that if there were to be a single agency conducting the Nation's activities in space, it would probably be the military that would be doing this. This would require a basic change in the philosophy under which this law was first enacted.

We find not real difficulty in working as we are, jointly, with the Department of Defense.

Mr. DADDARIO. It seems to me that what you say doesn't follow a logical train of thought. You are making the military uses of space superior to the peaceful uses of space. The latter is the end to which we are directed. It seems to me that what you are asking the services to do is to use existing facilities to support you.

As you become successful in the area of development, the requirements of the military become more apparent, and at that stage of the game, they could be fulfilled. The completed product would be adaptable to change to meet military requirements.

It would seem to me that you would accomplish more in this manner, rather than in the hodgepodge manner which seems to exist today and which, I fear, will continue.

I don't see how this overcomes the need of direction and control to avoid duplication. Above all, as Mr. Quigley said, we need a man at the top who must take responsibility.

That is all.

The CHAIRMAN. The gentleman's time has expired. And the time of Dr. Glennan and Dr. Dryden has expired here.

Dr. DRYDEN. We will be back. Are you in session this afternoon?

The CHAIRMAN. In the meantime, we will proceed to interrogate Mr. Johnson.

Dr. GLENNAN. Thank you.

The CHAIRMAN. We don't plan to have an afternoon session.

Dr. DRYDEN. We will be back in the morning then, sir.

Dr. GLENNAN. Thank you, sir.

The CHAIRMAN. All right, sir.

Mr. Johnson, if you will take a position near the microphone, we would appreciate it. You are General Counsel for NASA, and we assume are well versed in the provisions of this bill and are prepared to answer our questions.

Mr. JOHNSON. Mr. Chairman, I will do my best.

The CHAIRMAN. Fine. Well, we will recognize Mr. Moeller.

Mr. MOELLER. I have no questions now, Mr. Chairman.

I would rather wait with what I want to discuss until Dr. Glennan is back with us.

The CHAIRMAN. All right. Mr. King?

Mr. KING. Mr. Johnson, I think the same thing is troubling me as has troubled some of the other Congressmen and which has prompted their questioning.

Let me explore it a little further. When General Medaris was before our committee, he stated categorically that where you have two agencies such as NASA and the Department of Defense pursuing what he said is essentially one program, there is an inevitable overlapping and duplication which is wasteful; it is dilatory and it tends to defeat the objectives of that program. He said, for example, where you have two vast organizations both of which are carrying on research work in more or less comparable fields, it is inevitable and there is nothing that you can do to stop it, that there will be laboratories that will be actually engaged in the very same work, they will be covering the same ground, trampling down the same grass, so to speak, and his argument was that by bringing them together under one organizational umbrella, you would eliminate at least 20 percent of the cost and the duplication which creates that cost.

Now, in the bill before us, it seems to me that we are moving in the opposite direction. Instead of trying to gather them together under one umbrella, it seems to me we are pushing them still further apart, because we do have the Space Council and the Civilian-Military Liaison Committee both of which would be abolished, and in their place

Dr. Glennan suggests that he will have a personal advisory committee to help him on these problems of liaison. But it seems to me that his advisory committee would actually do less to bring these two programs under one umbrella than the Space Council and the Civilian-Military Liaison Committee that we now have.

If I were to vote for this bill, I would find myself in a position of favoring just exactly the opposite course to that which I have taken up to now. I have always believed that we need more coordination in our space effort rather than diversification.

Now, I have rambled a little, but could you perhaps direct some remarks to my general comments?

Mr. JOHNSON. Well, I think I could, Mr. King, with respect to the present situation.

I don't think that the Civilian-Military Liaison Committee now functions or was intended to function in such a way as to bring these under one roof, as you described it. I think the purpose of the Committee, at least on the face of the statute, was to facilitate communication and advice between the two agencies concerned with the total national activity in space.

But, as the Administrator has pointed out, the problems of communication and liaison and coordination are much too vast and continuous to be funneled through a single committee. So the only purpose of this change in the law is to eliminate what Dr. Glennan described as a possible bottleneck and to recognize that this is a problem that cannot be handled through a particular channel of this kind.

Now, so far as your broader comments are concerned, Dr. Glennan has dealt with the subject himself in his closing remarks this morning. I think that the concept of a single space program rather than a separate civilian space exploration program and a separate military utilization of space, is largely related to the history of the very recent past and the present situation which has caused the civilian space exploration program to be so largely dependent upon the hardware developed by the military for intercontinental and intermediate range ballistic missiles.

At the present time, as you know, we are relying upon the Atlas in the Project Mercury program. We have been relying very largely upon boosters derived from the Thor and Jupiter programs in our satellite experimentation to date, the Vanguard program excepted.

This is a situation, I think, of rather temporary significance. As we move ahead now into such things as Saturn, about which the committee has heard a great deal, and other programs that we have, we will be developing for the civilian space exploration program hardware that has no immediate, nor for that matter, any specifically foreseeable military utilization.

I believe the distinction between the civilian uses of space and the military uses of space will become much clearer than they have been up to the present time.

Now, it is true that both the civilian and military utilization of space will continue to depend to a great extent upon the same basic technology in the field of launch vehicle development.

That would be the area in which the overlapping or duplication that you speak of is most likely to occur.

Mr. KING. If I may interrupt——

The CHAIRMAN. The gentleman's time has expired.

Mr. KING. All right. I appreciate your answer on that.

The CHAIRMAN. Mr. Morris?

Mr. MORRIS. No questions, Mr. Chairman.

The CHAIRMAN. Mr. McDonough?

Mr. MCDONOUGH. No questions for the present.

The CHAIRMAN. Proceed then, if you will, to finish your answer to Mr. King's question——

Mr. JOHNSON. I think I should finish by saying that in the field of launch vehicle development—the term "launch vehicle" is defined in this bill to include what have generally been called boosters up to the present time—we must recognize that the same launch vehicle might be useful for both civilian and military purposes, although this is not quite as predictable for the future as it has been during the past couple of years.

Recognizing that situation, we have recommended the addition of a new section 309, which provides that the responsibility for development of each new launch vehicle will be assigned either to NASA or to the Department of Defense from its inception, so as to preclude duplication in that field. When you get out of the field of launch vehicle development, it is very difficult to conceive of wasteful duplication, assuming, of course, that the program is rationally planned and worked out; and this is being done in consultation with the Defense Department all the time.

The CHAIRMAN. Mr. Miller?

By the way, I notice, Mr. Johnson, you have a fine statement here prepared for the committee. After Mr. Miller asks you a few questions, perhaps you would want to go through the statement.

Mr. MILLER. I just want to have one question to supplement Mr. King's statement. The forerunner of NASA, the agency from which you inherited most of your technical skill was the National Advisory Committee on Aeronautics, was it not?

Mr. JOHNSON. Yes, sir.

Mr. MILLER. The National Advisory Committee on Aeronautics did technical research work in the field of aeronautics for the military and it also performed work which was the basis of development for commercial aviation and other aviation; isn't that true?

Mr. JOHNSON. That is correct.

Mr. MILLER. And this was a civilian agency?

Mr. JOHNSON. Yes, sir.

Mr. MILLER. Purely a civilian agency. And your agency is the successor of NACA, so that it has been demonstrated that research and development can be accomplished without duplication. Lord knows, NACA did all of the real technical work in development of military planes, and then turned the results over to private industry. That is all we propose to do in this case, more or less, isn't it? There is a parallel between them——

Mr. JOHNSON. There is a parallel, and it ought to be made clear that NASA still has these same responsibilities that NACA had and is still continuing that kind of work. So that in that respect, while NASA is a civilian agency, its work at the research end is not confined to the civilian uses of aeronautics and space. We are still

cooperating and assisting the military in the development of military weapons systems. But the actual responsibility for development is with the military. NASA, like its predecessor, NACA, is a kind of handmaiden to the military in this field by doing the basic and applied research necessary to make their development programs a success.

Mr. MILLER. That is all, Mr. Chairman.

The CHAIRMAN. Now, your statement. It is a fine statement; I have read a part of it. Would you like to take it up in detail or would you rather brief it in your own language?

Mr. JOHNSON. I think so long as it is in the record we might look at it together. I will read most of it, if that is all right with the chairman.

The CHAIRMAN. We will put it in the record as is and then you can brief it in your own language.

STATEMENT OF JOHN A. JOHNSON, GENERAL COUNSEL, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Mr. JOHNSON. Mr. chairman and members of the committee, the amendments to the National Aeronautics and Space Act of 1958 contained in H.R. 9675 are of several different kinds. The first kind consists of amendments designed to give effect to the recommendations of the President in his special message to the Congress on January 14, 1960. These amendments are found in subsections (1), (3), (4), (6)(B), (7), (9)(B), and (14) of the first section of H.R. 9675. The Administrator of the National Aeronautics and Space Administration has testified on the reasons for making these changes in existing law.

The remaining amendments contained in H.R. 9675 are designed to give NASA more flexible authority concerning the disposition of property rights in inventions made under NASA contracts; to grant NASA authority in several areas of activity equivalent to the authority already possessed by the military departments; and to make certain amendments of a technical nature to the National Aeronautics and Space Act of 1958.

PROPERTY RIGHTS IN INVENTIONS

Subsection (11) of the first section of H.R. 9675 repeals section 305 of the act and enacts in its place provisions which would give NASA a greater measure of discretionary authority concerning the disposition of property rights in inventions made under NASA contracts. The proposed amendment is substantively like the legislation enacted in 1950 for the National Science Foundation (42 U.S.C. 1871).

The proposed amendment was submitted by NASA to the Congress several months ago and has been the subject of extensive hearings by the Subcommittee on Patents and Scientific Inventions of this committee, chaired by Congressman Mitchell. In view of the detailed testimony given by NASA witnesses before the subcommittee which is now a matter of public record, I wish only to state at this point that it is our belief that NASA's ability to achieve the objectives of the National Aeronautics and Space Act of 1958 would be considerably enhanced by the proposed revision of section 305.

NEW AUTHORITY

Authority to "outlease" for nonmonetary consideration: Subsection (6)(D) of the first section of H.R. 9675 amends subsection 203(b)(3) of the act to provide authority to enter into leases of Government property for other than a monetary consideration. The amendment employs the same language used in 10 U.S.C. 2667(b)(5) and would provide NASA with the same kind of authority as is available to the military departments. As a case in point, it was once proposed by a group of local citizens that the areas around the runway of the NASA airport at Chincoteague, Va., be leased to them for agricultural purposes in consideration for their keeping the growth close cropped for the benefit of users of the runway, principally NASA. Their proposal could not be entertained, since NASA had no authority to accept other than a monetary consideration for a lease.

Authority to settle claims for past infringement of patents: Subsection (6)(F) of the first section of H.R. 9675 amends subsection 203(b) of the act to provide authority to settle claims against the Government for past infringement of patents. The military departments now enjoy the authority to settle such claims without imposing upon the claimant the necessity of litigation. This is found in 10 U.S.C. 2386. NASA has no adequate authority to settle such claims. Subsection 203(b)(13) of the act, giving authority to settle tort claims up to $5,000, is inadequate because of the dollar limitation; and subsection 203(b)(3), authorizing the purchase of patent rights, cannot be utilized to effect a settlement for past infringements if no subsequent use of the patent is involved. The proposed amendment would cover both full and partial settlements, both direct and contributory infringement, and would provide authority identical to that available to the military departments.

Authority to indemnify contractors against unusually hazardous risks: Subsection (13) of the first section of H.R. 9675 adds a new section 308 to the act, the purpose of which is to grant to NASA authority to indemnify contractors and subcontractors, within certain limits, against risks defined as unusually hazardous. Potentially disastrous liabilities and losses may arise from activities involving applications of atomic energy, the use of high-potency propellants, the development, testing, and operation of space vehicles, and a whole range of novel undertakings on the fringe of the unknown. Such risks arise solely because of governmental activities. This fact makes it incumbent upon the Government to recognize the possible consequences of its activities and to make adequate provision for them.

At the beginning of this session of Congress, NASA requested legislation in a more comprehensive form (H.R. 4148, 86th Cong.) to provide authority for the indemnification of contractors and subcontractors against unusually hazardous risks. At the same time, the Department of Defense requested substantially identical legislation (S. 2110, 86th Cong.). The Department of Defense's request was motivated by the need for authority to indemnify contractors engaged in production in addition to those engaged in research and development. The Department of Defense has had authority to indemnify research and development contractors since 1952 (10 U.S.C. 2354).

Neither the NASA bill nor the Department of Defense bill was given serious consideration at the last session. It appears that NASA will not be able to obtain the authority requested last year until the Department of Defense proposal is favorably considered by the Armed Services Committees.

The same need which supported the earlier proposal supports the provision in H.R. 9675 which is more limited in scope. The present authority available to the military departments, although confined to research and development contracts in 10 U.S.C. 2354, would go a long way toward solving NASA's problem. Accordingly, NASA desires that it be given the same legal authority as the military departments now enjoy, pending further consideration of the larger problem by the Congress. H.R. 9675 would do that. Authority to waive performance and payment bonds: Section 3 of H.R. 9675 amends the "Miller Act," 40 U.S.C. 270a–270e, to provide NASA with authority to waive performance and payment bonds otherwise required of Government contractors on construction work. The proposed amendment would give NASA legal authority identical to that of the military departments and the Coast Guard. It would tend to conserve NASA's appropriations to a slight degree. As a case in point, NASA has a cost-type contract with a large, responsible company which calls for the construction of tracing facilities. A military department would be able to waive performance and payment bonds in a case of this type where the financial responsibility of the contractor appears to warrant it and thus save the Government several thousand dollars, but NASA is precluded from doing so because of the lack of legal authority.

TECHNICAL AMENDMENTS

Subsection (2) of the first section of H.R. 9675 amends section 103 of the act by deleting the definitions of "aeronautical and space activities" and "aeronautical and space vehicles" and substituting new definitions of "spacecraft," "launch vehicles," "space vehicles," and "aeronautical vehicles."

The present definitions will no longer be useful if other sections of the act are amended as proposed. The new definitions are self-explanatory. It is to be noted that the term "spacecraft" does not appear anywhere else in the proposed amendments to the act, but its definition is required in order to give a precise definition to the new term "launch vehicle," which appears in the proposed new section 309 of the act.

Amendment to paragraph 203(b)(6) of the act: Subsection (6)(E) of the first section of H.R. 9675 amends subsection 203(b)(6) of the act to provide clarification of the authority of other agencies acting in cooperation with NASA. The proposed amendment specifically authorizes other agencies of Government to obtain items for NASA by entering into a contract for such items. Although we interpret the present statutory provision as including the authority to enter into such contracts, the additional phrase is proposed to preclude any question from being raised by another agency.

Amendments to subsection 304(b) of the act: Subsection (10)(A) of the first section of H.R. 9675 amends subsection 304(b) of the act to correct what appears to have been an unintentional omission. The

proposed amendment adds the phrase "or designee thereof" after the reference to "the Administrator" in connection with authorizing access to restricted data relating to aeronautical and space activities on condition that such access is required in the performance of duty and so certified by the Administrator. The making of these certifications is a routine function which should be delegable by the Administrator to security officers and others in accordance with the normal practice of the Atomic Energy Commission, the Department of Defense, and NASA.

Subsection (10)(B) of the first section of H.R. 9675 amends subsection 304(b) of the act to delete reference to the National Aeronautics and Space Council from the security provisions of the act. The proposed amendment is a necessary consequence of repealing section 201 of the act.

Amendment to subsection 306(a) of the act: Subsection (12) of the first section of H.R. 9675 amends subsection 306(a) of the act to include authority for establishment of an Inventions and Contributions Board. The proposed amendment is a necessary consequence of repealing subsection 305(f) of the act which presently contains authority for establishment of such a Board. Moreover, it is appropriate that the section of the act dealing with functions of the Board should also contain the authority for its establishment.

Amendment of 18 United States Code 799: Section 2 of H.R. 9675 amends section 799 of title 18 of the United States Code to substitute for the words "aircraft, missile, spacecraft, or similar vehicle" the more comprehensive term "aeronautical or space vehicle." Title 18, United States Code, section 799, provides criminal penalties for violations of regulations or orders promulgated by the Administrator of NASA for the protection of security of property and equipment. The proposed amendment is required to conform to the definitions contained in the proposed amendment to section 103 of the act.

NASA regards each of the amendments to existing law contained in H.R. 9675 as highly desirable and strongly recommends their early enactment.

I think I should say that this statement was designed to supplement Dr. Glennan's testimony by dealing with those portions of the legislation that do not reflect the larger policy considerations mentioned in the President's message.

Mr. Chairman and members of the committee, the amendments to the National Aeronautics and Space Act of 1958 contained in H.R. 9675 are of several different kinds. The first kind consists of amendments designed to give effect to the recommendations of the President in his special message to the Congress on January 14, 1960. These amendments are found in subsections (1), (3), (4), (6)(B), (7), (9)(B), and (14) of the first section of H.R. 9675. The Administrator of the National Aeronautics and Space Administration has testified on the reasons for making these changes in existing law.

The remaining amendments contained in H.R. 9675 are designed to give NASA more flexible authority concerning the disposition of property rights in inventions made under NASA contracts; to grant NASA authority already possessed by the military departments; and to make certain amendments of a technical nature to the National Aeronautics and Space Act of 1958.

The first one concerns property rights in inventions.

Mr. Chairman, since these remarks were prepared before the committee took the action it did this morning, I should simply like to state that NASA witnesses testified during the very extensive and enlightening hearings held by Mr. Mitchell's subcommittee. Our testimony is a matter of public record, and while the subcommittee has recommended a bill which departs in some respects from the bill we recommended, NASA is heartily in favor of the subcommittee's bill and recommends strongly that it be acted upon favorably by the committee as a whole. We hope that it will be enacted by the Congress at the earliest possible date.

The CHAIRMAN. We will get a copy of that. Do you recommend it be enacted as a separate bill or as a part of this?

Mr. JOHNSON. We would recommend that it be inserted in H.R. 9675 in lieu of the provision that is in there now. But I think that so far as tactics in achieving passage are concerned, I would prefer to leave that in the committee's hands.

The CHAIRMAN. Nonetheless you recommend that the bill of the subcommittee headed by Mr. Mitchell be reported favorably?

Mr. JOHNSON. Yes, sir.

We believe that the whole patent problem has been a very difficult one for us during the past year and a half. We have been very appreciative of the attention given to it by the subcommittee. And we feel that the amendments they have recommended will facilitate the space program.

The CHAIRMAN. Fine. Just proceed, then.

Mr. SISK. Mr. Chairman, may I ask one question along that line of Mr. Johnson? As I understand what you are saying then is that you approve of what Mr. Mitchell's subcommittee has recommended. The original recommendation of NASA went a little further, is that not true? In other words, you approve the recommendations of the subcommittee as far as they go, but NASA would like to have gone even further? Is that NASA's position?

Mr. JOHNSON. No, sir, I wouldn't say so. The original proposal that NASA presented would have given NASA a little broader area of discretion, but the conditions imposed by the bill the subcommittee has reported are basically in accordance with the intention of NASA in exercising the authority which it would have been given by the bill we submitted. So we do not regard them as a restriction on our activities, but rather in accordance with our intentions.

Mr. SISK. Thank you.

The CHAIRMAN. You are saying in effect that the bill reported out by the subcommittee will do the job for NASA just as well as NASA's own recommendation?

Mr. JOHNSON. Yes, sir.

The CHAIRMAN. All right. Please proceed with your statement.

Mr. JOHNSON. Now, there are a number of items in the legislation that grant new authority to NASA and here I can assure you that our overriding purpose in proposing these things is to achieve 100 percent parity with the Department of Defense in the field of business relationships.

During the past year, we have attempted in every way possible, by Executive order, directive, and regulation, to eliminate the few areas

in which NASA didn't possess the same authority in the field of contracting and business management that the Department of Defense has. We have gone as far as we can without legislation. Patents, of course, were the outstanding exception. There are a few others left and in these cases we are not asking that the committee or the Congress strike out on new ground, but simply recognize the usefulness of legislation previously enacted for the Defense Department. We hope that we will obtain the same kind of authority from the Congress.

The first is authority to out-lease for nonmonetary consideration.

Subsection (6)(D) of the first section of H.R. 9675 amends subsection 203(b)(3) of the act to provide authority to enter into leases of Government property for other than a monetary consideration. The amendment employs the same language used in 10 U.S.C. 2667 (b)(5) and would provide NASA with the same kind of authority as is available to the military departments. As a case in point, it was once proposed by a group of local citizens that the areas around the runway of the NASA airport at Chincoteague, Va., be leased to them for agricultural purposes in consideration for their keeping the growth close-cropped for the benefit of users of the runway, principally NASA. Their proposal could not be entertained, since NASA had no authority to accept other than a monetary consideration for a lease.

I might add here that we are simply asking, in almost precisely the same language, for what the Department of Defense already has by way of legal authority.

Second is the authority to settle claims for past infringement of patents.

Subsection (6)(F) of the first section of H.R. 9675 amends subsection 203(b) of the act to provide authority to settle claims against the Government for past infringement of patents. The military departments now enjoy the authority to settle such claims without imposing upon the claimant the necessity of litigation. This is found in 10 U.S.C. 2386. NASA has no adequate authority to settle such claims. Subsection 203(b)(13) of the act, giving authority to settle tort claims up to $5,000, is inadequate because of the dollar limitation; and subsection 203(b)(3), authorizing the purchase of patent rights, cannot be utilized to effect a settlement for past infringements if no subsequent use of the patent is involved. The proposed amendment would cover both full and partial settlements, both direct and contributory infringement, and would provide authority identical to that available to the military departments.

The next is authority to indemnify contractors against unusually hazardous risks.

AUTHORITY TO INDEMNIFY CONTRACTORS AGAINST UNUSUALLY HAZARDOUS RISKS

Subsection (13) of the first section of H.R. 9675 adds a new section 308 to the act, the purpose of which is to grant to NASA authority to indemnify contractors and subcontractors, within certain limits, against risks defined as unusually hazardous. Potentially disastrous liabilities and losses may arise from activities involving applications

of atomic energy, the use of high-potency propellants, the development, testing, and operation of space vehicles, and a whole range of novel undertakings on the fringe of the unknown.

Such risks arise solely because of governmental activities. This fact makes it incumbent upon the Government to recognize the possible consequences of its activities and to make adequate provision for them.

At the beginning of this session of Congress, NASA requested legislation in a more comprehensive form (H.R. 4148, 86th Cong.) to provide authority for the indemnification of contractors and subcontractors against unusually hazardous risks. At the same time, the Department of Defense requested substantially identical legislation (S. 2110, 86th Cong.). The Department of Defense's request was motivated by the need for authority to indemnify contractors engaged in production in addition to those engaged in research and development. The Department of Defense has had authority to indemnify research and development contractors since 1952 (10 U.S.C. 2354). Neither the NASA bill nor the Department of Defense bill was given serious consideration at the last session. It appears that NASA will not be able to obtain the authority requested last year until the Department of Defense proposal is favorably considered by the Armed Services Committees.

The same need which supported the earlier proposal supports the provision in H.R. 9675 which is more limited in scope. The present authority available to the military departments, although confined to research and development contracts in 10 U.S.C. 2354, would go a long way toward solving NASA's problem. Accordingly, NASA desires that it be given the same legal authority as the military departments now enjoy, pending further consideration of the larger problem by the Congress. H.R. 9675 would do that.

I might add that we are saying here that we would rather have half a loaf than none at all. Since our business is research and development primarily, the existing authority of the Department of Defense would largely satisfy our problem. We recognize that extending this authority into the field of production, as the companion bills the Department of Defense and NASA submitted last year would do, raises some very serious policy problems and appears to put the matter primarily in the province of the Armed Services Committee. So we are simply asking for this.

The CHAIRMAN. As I remember NASA's request last year went far beyond what you now indicate would be helpful to you.

Mr. JOHNSON. It did go beyond it, sir. We are still interested in getting that kind of authority, but we know it is unrealistic to expect that authority to be given to our agency in advance of the Department of Defense. In view of the fact that the enlargement of their authority appears to pose a major problem for the Armed Services Committees, we would like to achieve parity first and then proceed with the larger question in due course.

The CHAIRMAN. All right.

Mr. SISK. Mr. Chairman.

The CHAIRMAN. Mr. Sisk?

Mr. SISK. Mr. Johnson while we are on this particular subject I would like an explanation regarding a matter which was discussed at

great length, I recall, at the time we wrote the initial act in the select committee.

Now, will you explain to me what indemnification rights with reference to hazardous conditions are provided in the present act?

Mr. JOHNSON. None whatsoever in the present act. That whole section was completely stricken before the present act was enacted.

It was in the House version, I believe.

Mr. SISK. That is the point I am making—I am positive, and I am sure the chairman remembers we had extensive discussions on this—there is our distinguished counsel sitting with us this morning—I am sure we had written it into the House bill.

I suppose I should have known it had been stricken.

Mr. JOHNSON. We have nothing at the present time and we feel this is an unfortunate lack in the law.

The CHAIRMAN. Stricken out in the Senate?

Mr. JOHNSON. It was agreed by the Senate and House conferees to leave it out. The feeling at that time was that this should await further study. I think they probably were motivated by concern over the total problem—the extension of the Department of Defense authority which has been pending before the Armed Services Committee—and felt that perhaps it was not timely to give NASA such broad authority as was included in that bill.

That House bill, as I recall, would not have limited the authority to research and development contracts as our present proposal does, but would have covered the entire field such as the Department of Defense is presently seeking.

Mr. SISK. That is certainly what I remember about our original language, it would have been rather broad in its concept. Thank you, Mr. Chairman.

The CHAIRMAN. Proceed, Mr. Johnson, with your statement.

Mr. JOHNSON. The next item concerns authority to waive performance and payment bonds.

Section 3 of H.R. 9675 amends the Miller Act (40 U.S.C. 270a–270e) to provide NASA with authority to waive performance and payment bonds otherwise required of Government contractors on construction work. The proposed amendment would give NASA legal authority identical to that of the military departments and the Coast Guard. It would tend to conserve NASA's appropriations to a slight degree. As a case in point, NASA has a cost-type contract with a large, responsible company which calls for the construction of tracking facilities. A military department would be able to waive performance and payment bonds in a case of this type where the financial responsibility of the contractor appears to warrant it and thus save the Govenment several thousand dollars, but NASA is precluded from doing so because of the lack of legal authority.

This again is nothing but a cleanup provision. We have scoured the statutes to be sure that we haven't left any stone unturned in being able to deal with the same flexibility and, we hope, wisdom that the Department of Defense would use.

Now, those are the only requests for new authority. I should like to deal now with several amendments we call technical amendments.

Subsection 2 of the first section of H.R. 9675 amends section 103 of the act by deleting the definitions of "aeronautical and space activi-

ties" and "aeronautical and space vehicles" and substituting new definitions of "spacecraft", "launch vehicles", "space vehicles", and "aeronautical vehicles."

The present definitions will no longer be useful if other sections of the act are amended as proposed.

I might simply add that there is now a good deal more precision, in language than was available in the spring of 1958. The attempt to delineate more clearly the responsibility of NASA has led us to propose the abandonment of these broad, undifferentiated terms, "aeronautical and space activities", and "aeronautical and space vehicles" and to use more precise terminology.

The new definitions are self-explanatory. It is to be noted that the term "spacecraft" does not appear anywhere else in the proposed amendments to the act, but its definition is required in order to give a precise definition to the new term "launch vehicle" which appears in the proposed new section 309 of the act.

I should add also that these terms and these definitions conform to the newly established usage of NASA. I think you will hear these terms frequently. You have heard them in the presentations made by NASA witnesses in support of authorization legislation. We think we have arrived at satisfactory definitions. I should add that these definitions were worked out in consultation with the Department of Defense. We understand that they appear satisfactory to them.

We then have an amendment to paragraph 203(b)(6) of the act.

Subsection (6)(E) of the first section of H.R. 9675 amends subsection 203(b)(6) of the act to provide clarification of the authority of other agencies acting in cooperation with NASA. The proposed amendment specifically authorizes other agencies of Government to obtain items for NASA by entering into a contract for such items. Although we interpret the present statutory provision as including the authority to enter into such contracts, the additional phrase is proposed to preclude any question from being raised by another agency.

Such questions have been raised. So far we have satisfactorily resolved them, but we think it would be helpful to make this explicit.

Mr. SISK. Mr. Chairman, may I ask the witness a question?

The CHAIRMAN. Well, Mr. Sisk, I would prefer to have him finish his statement before he is questioned.

Mr. SISK. I don't see the point in going through this if we are not going to be able to clarify it.

The CHAIRMAN. It is my thought that he should be allowed to finish his statement and then we will ask him questions. I think others on the committee might want to ask him questions, too.

Please just proceed with your statement, Mr. Johnson.

Mr. JOHNSON. Amendments to subsection 304(b) of the act.

Subsection (10)(A) of the first section of H.R. 9675 amends subsection 304(b) of the act to correct what appears to have been an unintentional omission. The proposed amendment adds the phrase "or designee thereof" after the reference to "the Administrator" in connection with authorizing access to restricted data relating to aeronautical and space activities on condition that such access is required in the performance of duty and so certified by the Administrator. The making of these certifications is a routine function which should be delegable by the Administrator to security officers and others in accord-

ance with the normal practice of the Atomic Energy Commission, the Department of Defense, and NASA.

Subsection (10) (B) of the first section of H.R. 9675 amends subsection 304(b) of the act to delete reference to the National Aeronautics and Space Council from the security provisions of the act. The proposed amendment is a necessary consequence of repealing section 201 of the act.

Amendment to subsection 306(a) of the act.

Subsection (12) of the first section of H.R. 9675 amends subsection 306(a) of the act to include authority for establishment of an Inventions and Contributions Board. The proposed amendment is a necessary consequence of repealing subsection 305(f) of the act which presently contains authority for establishment of such a Board.

That is part of the patent provision.

Moreover, it is appropriate that the section of the act dealing with functions of the Board should also contain the authority for its establishment.

Amendment of 18 U.S.C. 799.

Section 2 of H.R. 9675 amends section 799 of title 18 of the United States Code to substitute for the words "aircraft, missile, spacecraft, or similar vehicle" the more comprehensive term "aeronautical or space vehicle." 18 U.S.C. 799 provides criminal penalties for violations of regulations or orders promulgated by the Administrator of NASA for the protection or security of property and equipment. The proposed amendment is required to conform to the definitions contained in the proposed amendment to section 103 of the act.

NASA regards each of the amendments to existing law contained in H.R. 9675 as highly desirable and strongly recommends their early enactment.

The CHAIRMAN. Thank you very much, Mr. Johnson.

Now, Mr. Sisk has some questions he wants to ask you in reference to the latter part of your statement in which you deal with technical amendments. Frankly, I have some questions, too. I think the other members have also. I think we ought to take your statement back to our offices, go over this bill in the light of your statement, and then we can make notations as to what your views are.

Now, Mr. Sisk, you were asking some questions.

Mr. SISK. Mr. Chairman, I think in light of the time, the logical thing to do is to study this and question Mr. Johnson later when he reappears before the committee.

The CHAIRMAN. You will be here tomorrow morning?

Mr. JOHNSON. Yes, sir.

The CHAIRMAN. For the members of the committee who are still here, I would like to announce that we shall devote tomorrow to getting down to specific questions with the witnesses from NASA. After tomorrow, we will proceed with the other witnesses.

We have lengthy hearings set up on this bill. Later on, we expect to have the Secretary of Defense here as one of the witnesses. We want his views on how this proposed legislation would affect the Defense Department. Later on, we will probably hear the testimony of the Secretaries of the military departments. We want to hear from all interested parties and I want everybody to be fully informed as to the specific details of this bill.

Now, Mr. Sisk, if you and the committee prefer, we can start asking Mr. Johnson questions first thing in the morning. You will be available then, won't you?

Mr. JOHNSON. Yes, sir.

The CHAIRMAN. Mr. Quigley?

Mr. QUIGLEY. May I be heard?

The CHAIRMAN. Yes.

Mr. QUIGLEY. In passing out homework assignments, I would like to suggest one for Mr. Johnson. In connection with the Mitchell subcommittee report which was received today, I think our colleague from Pennsylvania, Mr. Fulton, aptly described the report as a solution of the views, perhaps not the unanimous solution, but a solution of the views of the committee.

I had a feeling that the original NASA proposal would be aptly described as a solution of the views within the Administration. Now, the thing that bothers me, and the reason why I am dissenting so far, is that while we have a solution of the views within the Administration and a solution of the views within the subcommittee, how close are we to a solution of the problem? And I would welcome your frank criticism about the amendments and the changes that the subcommittee has wrought on your original proposal. They have made some real changes. On the surface they appear to be improvements, but I am wondering whether they really are. I also wonder how feasible they are from an administrative point of view. I would like to go into that in some detail tomorrow, if we have the opportunity.

The CHAIRMAN. Will you be prepared to answer that tomorrow? Tomorrow, we shall also hear Mr. William M. Holaday, Chairman of NASA-DOD Civilian——

Mr. YEAGER. Mr. Chairman, that is Thursday.

The CHAIRMAN. That is Thursday.

Mr. YEAGER. Yes, sir. Tomorrow is reserved for NASA entirely.

The CHAIRMAN. Tomorrow is reserved for Mr. Johnson, Dr. Glennan, and Dr. Dryden.

Mr. YEAGER. That is right.

The CHAIRMAN. If there is no further business, then, we will adjourn until tomorrow morning at 10 o'clock.

(Whereupon, at 12 o'clock noon the committee adjourned to reconvene at 10 o'clock a.m., Wednesday, March 9, 1960.)

TO AMEND THE NATIONAL AERONAUTICS AND SPACE ACT OF 1958

WEDNESDAY, MARCH 9, 1960

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND ASTRONAUTICS,
Washington, D.C.

The committee met at 10 a.m., Hon. Overton Brooks (chairman) presiding.

The CHAIRMAN. The committee will come to order.

This afternoon we have a very heavy schedule on the floor. We will have to adjourn promptly at 12. In fact, we had better adjourn just a little bit before 12 in order to vote on our authorization bill, which is, I believe, the first vote up.

This morning we have Dr. Glennan back with us, accompanied by Dr. Dryden, and Mr. Johnson, General Counsel of NASA.

We are happy to have you here this morning.

Now, Doctor, as I understand the administration's proposal, you would abolish the Space Council. You would leave a sort of vacuum there, wouldn't you? What agency would perform the functions of the Space Council?

STATEMENT OF DR. T. KEITH GLENNAN, ADMINISTRATOR; ACCOMPANIED BY DR. HUGH L. DRYDEN, DEPUTY ADMINISTRATOR; AND JOHN A. JOHNSON, GENERAL COUNSEL, NASA—Resumed

Dr. GLENNAN. Mr. Chairman, I don't think one would leave a vacuum at all, because what is expected of the administration, speaking now of NASA, is that it take responsibility for managing this space exploration program. It would seem clear to me that the best way to do this is to have as few administrative impediments as possible, that to insert over the administration another body which presumably is simply reporting what it sees in the administration to the President accomplishes no useful purpose.

The CHAIRMAN. This committee has felt that an advisory panel would be of great help to us, and we set up a panel of outstanding scientists to advise the committee. You seem to be charting a brand-new course for this country's space activities, to be carried forward without any overall guidance. Is that not your intention?

Dr. GLENNAN. Mr. Chairman, as I said yesterday, it is my intention to appoint an advisory group such as you speak of in the same manner in which the committee has appointed an advisory group to it.

This is a group which would be advisory to the Administrator, would not be inserted between the Administrator and the person to whom he is responsible, the President.

Do I make that point clear?

The CHAIRMAN. You make it clear, but you don't clear up the point that is disturbing me.

Dr. GLENNAN. Well, on matters of organization of this kind, it seems to me that the responsibility for management ought to be as unfettered as possible, that is, the lines between the various levels of organization should be as direct as possible.

One can and should, in dealing with public funds of the magnitude of these, I think, bring in whatever advice may be necessary, but the responsibility for the management of the operation seems to me to devolve clearly upon the administrator, himself, with his staff.

The CHAIRMAN. At the beginning, I questioned the wisdom of placing the President as chairman of the Space Council. He has so many duties already.

I think the Congress assigns too many duties to the office of the President. I questioned this assignment at the time we considered the bill; but the administration wanted it that way, and I went along.

Do you feel that a sincere effort has been made to make the Space Council work, to perform the functions it was designed to perform?

Dr. GLENNAN. The Space Council, under the law, was established to advise the President on the discharge of his duties. I think that the extent to which it functioned under the law was clearly a matter that resided with the President and his interest in having advice on the particular duties he was undertaking.

In my opinion, it served a useful purpose. In my opinion the council provided an interim vehicle for developing the framework which we presently have in managing both the Nation's space exploration program, which is a responsibility of NASA, and the use by the military of the space environment for the satisfaction of military requirements.

I think the meetings with the council, with the President, brought face to face the people who had to make the ultimate decisions with respect to the agency responsible for the particular project.

The CHAIRMAN. Do you feel——

Dr. GLENNAN. To that extent, I think the Space Council did a very useful job; yes, sir.

The CHAIRMAN. If you feel that it has performed a useful function, what agency will perform that function in the future?

Dr. GLENNAN. Mr. Chairman, as I tried to point out, I don't think that job is a continuing job. If the Space Council were to be a continuing body, it seems to me it becomes the management body, and as such, I think you have nothing but one more layer of management.

The CHAIRMAN. Let me ask you this: Don't we provide in the law that the Chairman of the Joint Chiefs of Staff should be adviser to the President on military matters? He certainly isn't the manager of the President. Hasn't that worked pretty well?

Dr. GLENNAN. I am not quite sure if I get the point you are making, sir.

The CHAIRMAN. You are the head of an agency which is brand new, with a program that is uncharted. Your agency has no experience on which you can rely. I wonder whether or not the Congress is wise in eliminating an advisory council that might prove to be valuable to you as you move along with your activities which involve such a vast expenditure of funds.

Dr. GLENNAN. The Council was advisory to the President, Mr. Chairman.

The CHAIRMAN. Couldn't we make——

Dr. GLENNAN. It seems to me the responsibility for the space exploration program is best placed in the Administrator.

The CHAIRMAN. Yes. Would you have an advisory council to the Administrator?

Dr. GLENNAN. I have said, sir, that I would propose to do that. I have not developed plans for it, would not propose to develop plans for it until——

The CHAIRMAN. Is there anything wrong with the Congress providing for an advisory council by law?

Dr. GLENNAN. I think it is unnecessary for the Congress to do it. I have the authority under the law to make such appointments, to appoint such advisers as we may require, such consultants as we may require, to appoint such advisory committees as may be appropriate for purposes of consultation and advice to the Administration. That is 203(b)(7), and I would intend were this law to be changed, as proposed, to do just that. No change was suggested in 203(b)(7).

Had there not been a Space Council, sir, I would have done that before.

The CHAIRMAN. Of course, that would be a committee under you?

Dr. GLENNAN. Yes, sir.

The CHAIRMAN. Whereas, as Congress has set it up, it is not a committee entirely under you.

Dr. GLENNAN. But then, do you imply by that that the Congress should manage this program?

The CHAIRMAN. No. I think that Congress has a responsibility, though. Don't you?

Dr. GLENNAN. Not only that. We have a responsibility to the Congress which we try to discharge here regularly.

The CHAIRMAN. It is a mutual responsibility, and I am sure that you are not trying to avoid congressional authority?

Dr. GLENNAN. Not a bit.

The CHAIRMAN. We have the responsibility to set up the organization properly, and to make it work. The country isn't happy, I am not happy, with the way things have worked in the past, and I am sure I voice your views on that, too.

Dr. GLENNAN. Mr. Chairman, early in the past year, I should say, there was unhappiness on your part, on my part, on the part of all of us involved in this program. There isn't real satisfaction now, but it is a different kind of dissatisfaction, if you will.

I think we have gone through the formative stages, I think the Space Council has done its work with the President, and I think the President is satisfied now with the management responsibilities which have been crystallized through this year or year and a half of operation. Presently, I think, what we are after is the cleanest, simplest, most straightforward, laying on of responsibility that we can have.

The dissatisfaction I have today is with the pace at which we can go, and that pace is a quite different thing from an administrative matter. The pace is a matter, more particularly, of the technology with which we are dealing. It is a difficult one.

The CHAIRMAN. I think this, and I am sure you agree with me: We are not satisfied at all, happy at all, putting up a billion dollars a year, and that is really what the program ought to call for, and still running second to Russia.

My question is: "What will assist you and the Defense Department in meeting the challenge of overtaking Russia." We may be overtaking Russia with lightning speed. Frankly, however, I haven't seen it.

I doubt that we are overtaking Russia with any particular speed. That is my chief concern. Dr. Dryden?

Dr. DRYDEN. Mr. Chairman, could I join in this discussion of the role of the Space Council?

The CHAIRMAN. You may.

Dr. DRYDEN. I think that any of us in positions of responsibility are sufficiently humble to feel that we do need advice from many sources, and there are various kinds of advice needed. There is technical advice on technical details of the program, there is policy advice relating to very broad and general matters. The Congress furnishes us the overall policy advice in writing the bill, and in the various hearings before it.

Within the Administration, the Administrator of NASA is the President's principal adviser on the space program, on what the content of the space program should be.

However, this does impinge on the interest and responsibilities of other agencies. For example, the State Department in a great many aspects of the space program, the U.S. Information Agency, the Department of Defense, so that there are broad policy questions to be discussed.

Some of these questions can be taken care of between the two agencies. All of NASA's international relationships are matters that affect the State Department, and the first beginning of resolution of policies in such matters is discussion between officials of the State Department and NASA. If we cannot come to an agreement, this naturally moves into a higher realm. The President has numerous methods of advice—from his staff members, and from the National Security Council. There is provision for many of the matters relating to space, involving these broad questions, to be brought up for discussion in the Security Council itself.

The CHAIRMAN. Are you suggesting you would give the authority, at least a part of it, to the Security Council?

Dr. DRYDEN. There is no need to give it to them. They are the President's advisers on all matters relating to national security.

The CHAIRMAN. Yes. But we don't have the question of security involved in the peacetime use of space.

Dr. DRYDEN. I am referring to the security aspects of it.

The CHAIRMAN. Do I understand that what you have in mind is to place at least a portion of that responsibility in the Security Council?

Dr. DRYDEN. The proposal covers the general policy. Matters at a lower level, so to speak, other than those major national issues which are resolved by Congress and the Administration at its highest levels, the need for advice on these lower level policy matters would be met by a committee advisory to the Administrator. At still lower levels

there are the technical advisory committees, in which we talk about the technical details of programs.

The CHAIRMAN. I have consumed my time and I am not going to go any further. I will pursue this later on.

Mr. Anfuso?

Mr. ANFUSO. Dr. Glennan, if I understand this correctly, you are trying to remove a lot of redtape not only from the operations of your agency, but from the Government generally, in dealing with this space effort; isn't that correct?

Dr. GLENNAN. That is right.

Mr. ANFUSO. Now, you are going to have your own advisors; isn't that correct?

Dr. GLENNAN. I would expect to have an advisory committee, yes.

Mr. ANFUSO. And you would probably use some of the members presently on the President's Advisory Council?

Dr. GLENNAN. This might be the case. I have not——

Mr. ANFUSO. That would be entirely up to you?

Dr. GLENNAN. That is right.

Mr. ANFUSO. Which is perfectly all right.

So, in short, then, you would become the adviser to the President; isn't that right?

Dr. GLENNAN. That is right, sir.

Mr. ANFUSO. And if he wants to know anything about this program, you are the one to inform him?

Dr. GLENNAN. That is right.

Mr. ANFUSO. I think that is perfectly sound.

Let me ask you this: Does the Department of Defense have any authority over your agency?

Dr. GLENNAN. No; they do not.

Mr. ANFUSO. You are entirely independent of the Department of Defense; is that correct?

Dr. GLENNAN. That is right, sir.

Mr. ANFUSO. Do you think that NASA should become a department like DOD?

Dr. GLENNAN. You are speaking of a Cabinet department now?

Mr. ANFUSO. Cabinet.

Dr. GLENNAN. I don't think that I have given that matter as much consideration as I would like to. I know there have been some bills introduced on this matter and I need time to really put together my own thinking on that. Presently, I do not feel strongly that there is a need for a cabinet department.

Mr. ANFUSO. Don't state your feelings too strongly at this time, because I have introduced a bill which would accomplish it. [Laughter.]

Dr. GLENNAN. I understand.

Mr. ANFUSO. Do you predict that there will be a dual development of programs by DOD and NASA?

Dr. GLENNAN. If you mean by that, Mr. Anfuso, a duplication of programs, I think the answer is clearly, "No." The relationships which we have established, I think, are quite sufficient to avoid that kind of action. There will be, I am sure, in some of the very basic research activities which we may support at a university, and the DOD may support at a university, there will be apparent duplication,

but in most instances this is planned duplication. One tries two or three avenues of approach to the solution of a problem.

Mr. ANFUSO. In other words, there is perfect liaison between the two agencies. You have discussed the various programs with DOD and agreement has been reached.

In other words, the Department of Defense develops this, and NASA goes ahead with that. Or both may engage in certain programs together for scientific purposes; isn't that correct?

Dr. GLENNAN. That is correct. I would like not to leave the impression that anything is perfect. You used the term "there is perfect liaison." I think it is good liaison and from time to time we will need to take a look at it and make certain it is as good as we can make it. But in my opinion it is working exceedingly well at the present time.

Mr. ANFUSO. Thank you, Doctor.

The CHAIRMAN. Mr. Riehlman.

Mr. RIEHLMAN. Dr. Glennan, in respect to a question just asked by my colleague from New York, Mr. Anfuso, will you explain just exactly how this liaison is going to work between the Defense Department and your Administration? I suppose there will be some duplication, in some basic research programs, but I am concerned with the bigger projects that will be carried on, in which both NASA and DOD will be interested.

Dr. GLENNAN. There are several levels of interchange of information between ourselves and the Department of Defense, Mr. Riehlman.

At the technical level, our people are in rather constant contact with DOD scientists and engineers. They, in the Defense Department, have particular interest, we will say, in the meteorological satellite program. There are technical people from the Defense Department who are members of the steering committee on the meteorological satellite program. In communications, where we have agreed that there be a division of effort as between passive communications, NASA's responsibility, and active communication satellites, DOD's responsibility, we have crossmembership on committees, because we want to know what is going on in the active communications field, just as they want to know what is going on in the passive communications field. This is at the technical level where, as I said yesterday, there are technical decisions to be made. At the operating level, which is Mr. Horner's level, with the assistant secretaries of the separate services for research and development, and with Mr. York, the Director of Research and Engineering, there are operating policy problems. These are met, I think, by a rather—I would say it is not a formal day-by-day—we call you at 9 o'clock in the morning, you call us at 10—but the amount of traffic between those offices is really very great.

The men directly reporting to Mr. Horner, such as General Ostrander, who heads our Office of Launch Vehicle Programs, are in constant contact with their counterparts on the other side. General Ostrander, I am sure, must be discussing with the Cape Canaveral people constantly the use of the range and the pads down there and the plans for our building additions or utilizing buildings already there.

Then one gets to the policy level where Dr. Dryden, Mr. Horner, and myself will meet with Mr. Gates and Mr. Douglas. About once a month or once in 6 weeks I try to go over there, the three of us,

to have lunch with the service secretaries and the people who are concerned with research and development in the space field, so that there is this interlinkage at every level and the telephone between us is the best possible way of getting quick action. This is exactly the way we are presently operating, sir.

Mr. RIEHLMAN. So that if differences arise in Mr. Horner's field, or at the operational level, they will be referred to the Administrator and settled; is that correct?

Dr. GLENNAN. Exactly, exactly.

Mr. RIEHLMAN. You would have a direct line to these people under you who are in constant contact with the Defense Department.

Dr. GLENNAN. This is quite right, sir.

Mr. RIEHLMAN. Now, let me ask you this, Doctor: Did you serve on the space council?

Dr. GLENNAN. Yes; I was a member, statutory member, of the space council, sir.

Mr. RIEHLMAN. How often have they met?

Dr. GLENNAN. They met on the average once a month for the—what is it—17 months of our existence. I think there might have been 1 or 2 months during the vacation period where they did not meet, but there were times when we met 2 days in succession.

Mr. RIEHLMAN. Could you give us any idea of how effective those meetings were in passing information on to the President?

Dr. GLENNAN. I think they were constructive and effective. They were not a substitute for the intimate contact that I have with the President. I see him, I would guess, once every 2 weeks, something like that, to tell him about my program, our problems, to seek his advice, keep him advised.

With respect to the Space Council, there are more formalistic presentations and discussions than these advisories that I indulge in with the President, sir.

The CHAIRMAN. Will the gentleman yield at that point?

Mr. RIEHLMAN. Yes.

The CHAIRMAN. Doctor, in the New York Times of today there is an article. It quotes both you and Senator Anderson in reference to the Project Rover.

It says, among other things:

> That the congressional committee began to apply pressure for a reorganization of the management of Project Rover. The responsibility for the project is now divided between the Commission and the National Aeronautics and Space Administration, a division that committee members believe is slowing the progress of it.

Then it goes on. It says:

> Senator Anderson also expressed doubt that very effective administration of the project could be maintained through the present Interagency Coordination Committee. He suggested one man and one staff should provide the overall project direction as has been done in the case of the nuclear submarine development under Admiral Rickover.

What do you think of that? You must have some ideas on it.

Dr. GLENNAN. We are right in the middle of this discussion, Mr. Chairman. As a matter of fact, I just received a letter from Senator Anderson on this matter. He is concerned, I am sure. We have been working with the Atomic Energy Commission in what we think is a quite satisfactory arrangement with the Atomic Energy Commission

accepting responsibility for the development of the reactor and the testing of the reactor up through the ground test phase, while we have been developing the power-generating and pumping devices.

We support the AEC at this point. When it gets to a flight phase, we will take the lead position in it and we will ask them for support. So that there is—there seems to us to be no real problem here. But we are reexamining that. As a matter of fact, just before coming up here this morning I—Dr. Dryden and I met with our top staff to ask them to prepare a reply to this letter.

The CHAIRMAN. So your answer is that Senator Anderson and his committee were wrong, that there is no problem?

Dr. GLENNAN. My answer is not that Senator Anderson and his committee is wrong at all. [Laughter.] They may be right, but I think we need the time to reexamine this matter. If we believe—as a result of that examination, that we are right, then I am quite willing to say we are right.

But certainly he has the right to raise the question, and his action is causing us to reexamine this particular situation.

The CHAIRMAN. Then I can say this, that you feel this matter needs a reexamination?

Dr. GLENNAN. I feel that it is an important enough project so that it could be reexamined almost at any time, Mr. Chairman. The fact that Senator Anderson has sent the letter to us has triggered it off at the present time. We have been in rather constant contact, as a matter of fact, with the Atomic Energy Commission because they hold the key to a number of elements in this program that we are interested in, not only the Rover rocket, but the auxiliary power devices which we will require for very long life satellites, and I think there has been no lack of intercommunication between the two agencies or lack of decision as to who is responsible for what.

Now, we will reexamine it and see whether we reassert the present situation or modify it.

The CHAIRMAN. Will you advise us as to your negotiations?

Dr. GLENNAN. Most certainly, sir.

The CHAIRMAN. I want to thank the gentleman. I asked Mr. Riehlman to yield to me. He was kind enough to do it. Mr. Riehlman, you are still recognized. Mr. Miller wants you to yield to him.

Mr. RIEHLMAN. I will yield it my colleague from California.

Mr. MILLER. Then, Dr. Glennan, I take it, it is your position that you are willing to examine the present setup, and to come up with the best solution in order to further the project?

There is no hard, fast, frozen position on your side?

Dr. GLENNAN. Absolutely, Mr. Miller.

Mr. MILLER. Thank you.

The CHAIRMAN. Mr. Riehlman.

Mr. RIEHLMAN. I yield back my time.

The CHAIRMAN. Mr. Sisk?

Mr. SISK. Dr. Glennan, pursuing that particular question for a moment, have you read the statements of General Branch and Colonel Armstrong made to our subcommittee the other day?

Dr. GLENNAN. No; I haven't had an opportunity to read those thoroughly.

Mr. SISK. I wish——

Dr. GLENNAN. I understand something of what was said.

Mr. SISK. Mr. Finger was here representing your Agency.

Dr. GLENNAN. Yes.

Mr. SISK. In answer to questions and during a discussion of this, I think they made some rather significant statements. I would like to have your reaction to those statements, because——

Dr. GLENNAN. Who made the statements, Mr. Sisk?

Mr. SISK. General Branch and Colonel Armstrong, of AEC.

Dr. GLENNAN. Yes; I know them.

Mr. SISK. They were here and they demonstrated some of their equipment. Don't misunderstand me. Their statements were not an attempt to be critical, yet underlying them, I think there was an implication that they felt you fellows may not be fully carrying your end of this load; that NASA is not moving ahead as fast as AEC is capable of furnishing propulsion equipment for you.

I would like to have you examine their testimony. I think it is rather important, and I think it has some bearing on the discussion here. It seem to go to the point that Senator Anderson may have had in mind, also.

Dr. GLENNAN. I think that part of the discussion, Mr. Sisk, has been resolved, as a matter of fact, because we did agree that the program which the AEC had set up originally for fiscal year 1961 seemed a sound technoligical program to us and we thought it should be operated as they had then planned it.

So I don't believe there is any real argument in that situation at the present time.

Mr. SISK. Well, I don't wish to leave the implication that there is any real argument. I think General Branch tried to be very kind to you fellows: In other words——

Dr. GLENNAN. Thank you.

Mr. SISK. He answered some rather specific questions as to AEC's feeling. I realize, of course, that any agency is likely to push that product which it happens to be creating. In any event I would hope that you people would examine that testimony.

I want to ask you specifically about section 3 of the bill we have before us. I may be that Mr. Johnson will want to comment on this, since I am referring to the statements which he made regarding the proposed amendment to the Miller Act, having to do with the waiving of performance and payment bonds on construction work.

I have some very grave reservations about NASA becoming a construction agency when we already have some very fine construction agencies ready and prepared to do this work, and which have vast experience and competance in engineering and related fields.

Now, to what extend do you really need section 3, unless you propose to set up a construction agency within NASA.

Dr. GLENNAN. We would employ architect-engineers to design the structures that we needed and then ask for bids on those designs.

Mr. SISK. Why——

Dr. GLENNAN. I don't see why we need to set up a construction agency, Mr. Sisk.

Mr. SISK. Why can't you more economically use existing organizations of the Government that have the competance to handle the construction of these sites?

Dr. GLENNAN. Where we think that is to our advantage, we will do just exactly that.

As a matter of fact, I believe that the Corps of Engineers is carrying on some of the work for the Saturn project, at the present time, and will continue to do so.

They have also been doing jet propulsion laboratory, Dr. Dryden tells me.

Mr. JOHNSON. May I say something from the legal point of view, Mr. Sisk?

Mr. SISK. Yes.

Mr. JOHNSON. What we would do in these cases, where it was appropriate, would be to call upon one of the other agencies for assistance in the administration and the carrying out of the contract. The contract would still be, in the typical situation, our contract. It would be a NASA contract, and the Administrator would have the legal position that the Secretary of the Army or Navy or Air Force typically has in one of their own construction contracts.

Now, of course, it would be possible to simply place the requirement upon the military service and transfer the funds under the interpretation we have placed upon the law. As you will recall, yesterday I mentioned that we were asking for a clarifying provision in that connection, too.

But I would think that the normal process would be for the contract to be entered into by NASA and be a NASA contract, and to look to the Administrator of NASA for the source of all legal authority involved in the performance of that contract. This change we are asking for here would simply put the Administrator in exactly the same legal position as the heads of the services in the performance of those contracts.

Mr. SISK. You know, of course, that if the Air Force wants to build a hospital at an air base, the Corps of Engineers moves in and does the job. They handle the architectural work, do the engineering, and they design the building. They carry out the dictates of the Air Force in the construction of that hospital, of course.

I give this as an example. I feel that since the Government has competent organizations, such as the Bureau of Yards and Docks, and the Corps of Engineers, that their skills and knowledge and ability and background should be utilized, rather than NASA attempting to set up its own construction organization.

You may not want to set up a construction agency, but still, you are going to have to have people to do these jobs, and we have people presently available in other agencies who can do them. That is the point I am trying to bring out.

Dr. GLENNAN. I understand your point, Mr. Sisk. As I say, we have and will continue to make use of the Corps of Engineers. I don't know that we have ever used the Bureau of Yards and Docks in any of our operations, but the Corps of Engineers have served us. I see no reason for not continuing this, but I am not sure that we would want to say that everything that we were going to do was going to be done by the Corps of Engineers.

Mr. SISK. Of course, I am referring exclusively to the construction field.

Dr. GLENNAN. I understand that.

Mr. SISK. Construction of telemetering sites, and launching pads, and so on. This is a field separate and apart from research and development programs.

Dr. GLENNAN. Yes.

Mr. SISK. I just feel that to utilize the corps of engineers and such agencies could save money.

Mr. MILLER. Would the gentleman yield?

Mr. SISK. I will be glad to.

Mr. MILLER. Isn't it true sometimes the Corps of Engineers with its own work for the Army and Air Force finds itself pretty well bogged down? Right now I am waiting for the report on a little project out home and they have had to put it off for 6 months because they can't get personnel; at least that is the excuse they give.

Isn't this provision an escape for you? That is, in case the Corps of Engineers can't do the work, you will be able to go out and contract for the work to be done by private firms?

Dr. GLENNAN. I suspect there is much to what you say. There are also specialized requirements——

Mr. MILLER. I am not criticizing them for it.

Dr. GLENNAN. There are also specialized requirements from time to time that I suspect would lead us to go to organizations that might more expeditiously and more efficiently do the job for us. But this is a matter of judgment and we are not asking anything except the freedom to do the job in the manner that seems best to us at the time.

Mr. SISK. I think my time has expired, Mr. Chairman.

Mr. JOHNSON. Mr. Chairman, could I——

The CHAIRMAN. Off the record.

(Discussion off the record.)

The CHAIRMAN. Will the gentleman yield?

Mr. SISK. Yes, I will be glad to yield.

The CHAIRMAN. It seems to me what you are proposing to do under section 207(e) of title 40 of the Code, you would simply add NASA after the Secretary of the Army, Secretary of the Navy, Secretary of the Air Force and the Secretary of the Treasury. You propose simply that Congress give NASA the same authority which already exists in the other agencies, isn't that right?

Mr. JOHNSON. That is correct, Mr. Chairman.

And that additional authority would be required to put us in a position of parity with the military services even if we went all the way and used the construction agencies in the armed services for all of our construction, because the Miller Act, as it presently stands, is limited in the case of this waiver authority to contracts for construction of facilities for the armed services. So we would still have to amend the section in order to permit that authority to be available if the contract were for construction of a facility for NASA.

Mr. SISK. Mr. Chairman?

The CHAIRMAN. Yes.

Mr. SISK. That answers the question I asked. As I understand this provision, it would simply place NASA on a par with the Secretary of the Air Force or Secretary of the Army or Secretary of the Treasury as the case may be, which would still be necessary if you were to properly handle the carrying out of these contracts.

Dr. GLENNAN. That is right, quite right.

Mr. SISK. Even though you used an existing engineering facility.

Dr. GLENNAN. That is right.

Mr. SISK. Thank you, Mr. Chairman.

The CHAIRMAN. Mr. Fulton?

Mr. FULTON. Could I refer to the language on the proposed change to the declaration of policy and purpose? I don't see that your new subsection (b) of section 102 adds very much. Why do you propose a change? Look over on page 2 of the proposals. I don't see that subsection (c) is much different than what we already have in the act. I don't see what it adds. Then in section 103, subsections 1, 2, 3, and 4, bottom of page 2: In my opinion those definitions are not as good as the definitions that were contained in section 103, subsection 2 of the law. For example, it seems to me that not only might we have orbits around the Earth, but as the Russians have shown, we might have orbits around the Moon. So that an orbital vehicle is a much better description than simply one that orbits around the Earth. If we are going to do exploration, I would not want the act limited so that we can only do exploration with spacecraft vehicles that have as the destination another planet. I think you can go out and just explore, or you might go to a star, or you could orbit a star. You see, I think you are unnecessarily limiting yourself by a, if I might say it, a schoolteacher definition of what the present stage of the art is, and I don't think you should limit yourself by schoolteacher approaches.

Dr. GLENNAN. Mr. Fulton——

Mr. FULTON. I see we have a class here and I thought they would be interested——

The CHAIRMAN. Yes. Well, if the gentleman will yield, I want to say this: This morning we have representatives from the Gilman School of Baltimore, Md., accompanied by Mr. Woodworth and Mr. Jacobson. We are happy to have them here.

Mr. FULTON. I am sure the students of the Gilman School join me in this approach to definition.

Dr. GLENNAN. With respect to the matter of the definition of spacecraft: I believe that the subparagraph 1, where we say that spacecraft means devices manned and unmanned, which are designed to be placed into an orbit about the Earth or into trajectory to another celestial body including all instrumentation, propulsion, and guidance therein, would do just what you are suggesting.

Mr. FULTON. I would strike "about the Earth," and place "into orbit," or "into a trajectory" or "a flight without support or dependence upon the Earth's atmosphere." I don't want them to be going to a destination. I am one who has always insisted that exploration means very broad exploration. If we just want to shoot a woman out of a cannon and see what happens, let's do it.

Mr. JOHNSON. The definition of spacecraft, does not limit the term "space exploration" as used in other places in the act. The term "space craft" is only defined here for the purpose of giving a more useful and more precise definition to the terms "launch vehicles" and "space vehicles." The term "spacecraft" doesn't appear any other place in the bill except in the definition of launch vehicles and space vehicles.

As a matter of fact, the order of these four definitions could have been turned around in just the opposite direction, and some people

have so recommended. It would make no difference. But it might be helpful to start with No. 4 and read backward.

Mr. FULTON. May we just comment there? I think you are making distinctions without any reasons.

For example, the distinction between a space vehicle and a spacecraft is of little meaning to me. Furthermore, when you use the term launch vehicles, that is not the term that Dr. Dryden previously told us that we, as pseudoscientists on the committee, should use and that scientists were going to use from there on. He had quite a different appellation for it.

Dr. DRYDEN. I said we were trying to establish a uniformity of practice. We have used the word "booster" before. Some people think it means a rocket engine, some people think it means a rocket engine plus the fuel tanks.

Mr. FULTON. Yes, but the previous time you testified, somebody was with you, I think it was Richard Horner; and the remarkable thing was that you both used the term "booster" right straight through your testimony.

Dr. DRYDEN. I am afraid we did, because the attempt to standardize is relatively new. We also used payload for what we here call spacecraft, but payload is really the instruments and other useful devices inside of the piece that goes into orbit. This is an attempt to create a usage, using words which have not been used before, because other words have been used before by different people to mean different things. Whether this will be a successful move or not—we need your help to get it into law and then maybe people will use these terms.

Mr. FULTON. I certainly will be glad to help. Because on section 103(4) you are defining automobiles as aeronautical vehicles.

Dr. DRYDEN. They aren't designed for flight so far as I know.

Mr. FULTON. It says in section 103:

As used in this Act the term "aeronautical vehicles" means all vehicles, other than space vehicles, designed for flight, together with related equipment, devices, components and parts.

As you know, I tried to buy one of those ground cushion automobiles without wheels designed for flight, and that is certainly not a space vehicle.

Dr. DRYDEN. That is designed for air support, but hardly for flight.

Mr. JOHNSON. That is an aeronautical vehicle under these definitions, not a space vehicle.

Mr. FULTON. I am saying that you are calling the ground cushion automobile an aeronautical vehicle.

Dr. DRYDEN. I would argue with my friend here—although we shouldn't [laughter]—that moving over the ground at 5 miles an hour in an air cushioned vehicle is not flight [laughter].

Mr. JOHNSON. I defer to Dr. Dryden. [Laughter.]

Mr. FULTON. Seriously, that shows the difficulty of trying to categorize these vehicles at this time when things are changing so fast.

The CHAIRMAN. Will the gentleman yield?

Mr. MILLER. It also shows where Dr. Glennan can be right in the middle.

Mr. FULTON. But not right.

I yield.

The CHAIRMAN. How would you define balloons that go way up into the outer atmosphere? Are they in flight? Where are you going to put them under this definition?

Dr. DRYDEN. I would not call a ballooon either an aeronautical vehicle or a space vehicle.

The CHAIRMAN. What is it?

Dr. DRYDEN. It is a balloon. [Laughter.]

The CHAIRMAN. You recommend subsection 5 saying a balloon is a balloon?

Dr. DRYDEN. Yes. [Laughter.]

Mr. JOHNSON. I think we should point out here that we are not trying to provide a full glossary of space and aeronautical terms, but only to define those terms that need definition for the purpose of this act.

Dr. DRYDEN. I should say we are preparing——

Mr. FULTON. The definitions given previously, while indefinite, are certainly adequate. I cannot see the reason for going into this detail which automatically excludes certain things. For example, you have a Mercury man-in-space. Suppose he finds it necessary for him to get out of the capsule after he starts reentry, he may find it necessary at some point to get out of the capsule as soon as he has reentered a certain distance. He then has a free fall with a parachute. As a matter of fact, it is the end of a ballistic trajectory at that point, and it is slowed down by parachute. What is he, is he an aeronautical vehicle? Under this definition, he would seem to be an aeronautical vehicle, and I don't think he really is.

Mr. JOHNSON. Do you mean the man, himself, or the thing he was in?

Mr. FULTON. The man pulls the parachute; it is not an aeronautical vehicle.

Dr. DRYDEN. I think that is correct; it is not an aeronautical vehicle. It is a man in a parachute.

Mr. FULTON. I recommend you don't have the definitions——

Mr. JOHNSON. We do have a problem here of definition in the bill. I think the way to do it is to go through the bill and see whether the definitions are harmful or helpful. I cannot see where this case that you mentioned of the man in a parachute would be a real problem. On the other hand, because of the other changes, we have been compelled to come to some new terminology. I can point to one section here in which the old term was simply not adequate. Section 309 is the section providing that the President shall assign responsibility for the development of each new launch vehicle—heretofore called "booster"—with less precision, we think—to either the Department of Defense or to NASA. Now, when we introduce a new concept of this kind, we obviously have to define that term. We can't simply use the all-embracing term "aeronautical and space vehicle" in that context or we wouldn't be able to make the point.

In order to define the term "launch vehicle" we have to exclude certain things previously embraced in the comprehensive definition of "aeronautical and space vehicles."

Mr. FULTON. Then could I ask you at that point: First, suppose that we launch a vehicle that is to orbit the Moon and then return into the Earth's atmosphere, and secondly, suppose we launch a ve-

hicle that is to go out into an ellipse, with no idea of a trajectory to another celestial body, but under Keppler's second law, will return to the Earth.

You see, the second example is certainly a launch vehicle, but it is under neither one of your proposed definitions.

Dr. DRYDEN. That is what we call spacecraft. The objects that go into orbit or into space are the spacecraft. The part which puts them into space is the launch vehicle, whether that is one rocket, four rockets, five rockets, two rockets.

Mr. FULTON. You see, your launch vehicle is defined as meaning devices which propel and guide spacecraft into an orbit about the Earth. I have given you an example of one that orbits the Moon and does not orbit the Earth, and another example of one which goes into a trajectory but not to another celestial body; I gave you the example of one that goes out and makes an ellipse and comes back.

Dr. DRYDEN. I think your suggestion to delete the words, "about the Earth" would entirely correct the problem that you are discussing.

Mr. FULTON. Or into a trajectory that you must then redefine as not being dependent upon the Earth's atmosphere.

Dr. DRYDEN. No. All of these things, many of them come back and enter the Earth's atmosphere and are destroyed or recovered.

Mr. JOHNSON. There would simply be no need for that kind of qualification.

Mr. FULTON. Seriously, I think your definitions are inadequate considering the current state of the art. While you have proposed a definition to take care of certain things in your bill that need language conformation, they are not adequate at the present time, and they are meaningless to me at this point.

Dr. DRYDEN. We need some name to give to the part of the overall space vehicle that immediately returns to Earth; and a different name to give to the part which keeps on going.

Now, these are the terms that we have, after much discussion, selected as good ones for this. If there is some better suggestion, I think we would be glad to accept it.

The CHAIRMAN. Is the gentleman through? Mr. Quigley?

Mr. QUIGLEY. Dr. Glennan, going back to the point I raised yesterday about the analysis of Dr. Pickering and General Medaris' testimony, I presume if your routine was like mine yesterday, you haven't had a chance to do it.

Dr. GLENNAN. That is right, but it is in the works.

Mr. QUIGLEY. Right. I think the story in the morning paper about the Rover project illustrates again the importance of this thing. I have a feeling that: Well, here we go again. We just went through the struggle with the Army and NASA over Saturn, and we finally put NASA in charge of that. Now we may be starting off on a new wrangle for the next year and a half between AEC and NASA over Rover.

Dr. GLENNAN. There is no problem on this.

Dr. DRYDEN. Between AEC and ourselves.

Mr. QUIGLEY. I hope there is not. But you are proposing changes in the reorganization of NASA and its setup on the basis of your experience over a year and a half.

The thing that bothers me is this: Are the proposed changes sound; are they what we really need to do the job? I am not saying they are

not, but I would like your criticism of Dr. Pickering's proposal and General Medaris' testimony to point out where you think they are wrong or where you think they are right.

Dr. GLENNAN. I will see that you get that.

APRIL 4, 1960.

Hon. JAMES M. QUIGLEY,
House of Representatives,
Washington, D.C.

DEAR MR. QUIGLEY: A few weeks ago, you asked me to comment on the suggestions made by Major General Medaris and by Dr. William Pickering relating to the organization of the Nation's activities in space research and development. If I understood correctly their recommendations, each would employ but a single agency to carry out both military and nonmilitary activities in space. Unfortunately, they then differed in the choice of agency to be employed. General Medaris would center control in the Defense Department and Dr. Pickering would center control in the National Aeronautics and Space Administration. In subsequent hearings, many alternatives organizational arrangements have been suggested thus demonstrating the range of opinions available on this subject—but let me comment on these two proposals.

Should we now decide to concentrate control in the Department of Defense, the following actions would be required, in my opinion:

1. The Congress would be faced with the necessity for rewriting the Space Act of 1958 to remove the declaration of policy which states that activities in space should be devoted to peaceful purposes. We may be convinced that our Military Establishment is designed and maintained as an instrument of peace, but the bulk of the rest of the world would have difficulty in believing that story. It will be hard enough to maintain that NASA's activities in meteorology are peaceful in intent since television techniques are being employed to take pictures of cloud cover—think what implications would be drawn from such an activity under the control of the military.

2. During the past 18 months, laboriously and with some strain, we have put together from a variety of organizations inside and outside the Department of Defense a nonmilitary organization which has developed and is carrying out a broadly based program in space exploration. From this program will come significant new information and techniques that will be available to both the nonmilitary and military communities. To reverse field at this date would mean the retracing of those steps, so laboriously taken. In the process, morale would suffer and the character of the operation would change. It is doubtful that the total support of the scientific community would be as readily available to the program under military direction as is now the case.

3. It is highly probable—actually, in my opinion, certain—that military requirements would soon dominate the program. The well known, and often understandable, tendency of the military to move toward hardware before there is available a sufficient understanding of the basic information, materials, and processes necessary to the sound development of hardware would reduce materially the availability of the basic information we seek about the space environment.

4. The Nation's space exploration program is soundly conceived and is being prosecuted urgently with the various elements of the program sensibly interrelated in both time and content. Consistent, long-term planning and continuity of efforts, as well as stability in the direction of that effort, is essential to the successful discharge of responsibiliies in any field of science and technology. Military projects, by their very nature, tend to be "crash" projects 1 year and downgraded or forgotten the next. To subject the Nation's program in space exploration to these conditions would be less than desirable.

Turning now to Dr. Pickering's suggestion that both military and nonmilitary activities in space research and development be directed by NASA, I would comment as follows:

1. The seemingly obvious and frequently repeated comparison between the atomic energy field and space activities does not hold up under careful scrutiny. Dr. Killian, in testimony before your committee, put it this way: "Our atomic energy program, much more than space, rests upon a coherent technology and involves the control of identifiable physical materials. Space, in contrast, involves multiple materials and techniques." The military require launch pads and certain tracking stations for missile weapons systems research and develop-

ment activities. NASA can and does need identical facilities. It is not probable that the military would turn over to NASA those facilities unless, indeed, they expected to replace them for missile systems research and development. Very substantial expenditures would result.

2. Because of the conviction held by all of us that the defense of the Nation should take priority over nonmilitary activities in space exploration, it seems clear that military requirements for space systems would be placed by the DOD or NASA to such an extent that nonmilitary programs surely would suffer.

3. The competition for funds between military programs utilizing the space environment and other military programs designed to achieve the same or similar end results is one of the best assurances that military use of space will continue to be realistic.

There can be only two real reasons for placing the Nation's activities in space research and development under single management: The avoidance of duplication and the attainment of agreed objectives in the shortest reasonable time. Given the basic differences in approach to the solution of a problem and accepting the fact that the military must be responsible for the defense of the Nation and is not properly to be concerned with the broad sweep of space science and the development of new knowledge as an end in itself, it seems clear to me that separate but closely related and properly coordinated management of military and nonmilitary space activities is the sound procedure to be followed. Both the Secretary of Defense and the Administrator of NASA are aware of the concern you so understandably express over this matter. It is my conviction that we are well on the way to achieving a satisfactory management-level coordination that will work.

Thank you for inviting me to express my views on this question.

Sincerely yours,

T. KEITH GLENNAN, *Administrator.*

Mr. QUIGLEY. Where you think your proposal makes more sense.

Dr. GLENNAN. Well, naturally, Mr. Quigley, in coming up with this proposed change in the law, we did, I think, explore all of these alternative proposals. I would then say that my support of the proposed changes, in which I had some hand in the drafting, of course, would indicate that I believe this to be the best solution at the present time.

With respect to the AEC–NASA situation, there really is no problem there. The AEC is the agency in Government which has the most competence in the design and development of reactors.

We think NASA has a substantial competence in the field of flight which is not possessed by the AEC. How does one wed these two? We think we have wedded them in a satisfactory manner.

Senator Anderson has asked that we look at this and a little earlier in this session I told the chairman that we were going to take another look at it, just to satisfy Senator Anderson, if we can, that what we are doing is proper.

If it isn't proper and we can't satisfy him and ourselves, we will make a change.

Mr. QUIGLEY. Basically the thing that bothers me is that one of these days we are going to cooperate and coordinate and communicate and check and balance ourselves right off the face of this earth.

Dr. GLENNAN. You are quite right.

Mr. QUIGLEY. I think at some point somebody has got to be in charge of this thing and cross over DOD and cross over AEC and cross over everything to get the job done. This is what I want to see done, and I think the Congress should do everything possible to make this possible.

To shift gears to you, Mr. Johnson, has anyone given any thought or consideration in the indemnification section to the desirability of a

limitation? As I read that section now, it is pretty much a blank check. That is page 16 of the section.

Mr. JOHNSON. Yes, Mr. Quigley, this has been given a lot of serious consideration. The bill that we submitted last year as a companion bill to that submitted by the Department of Defense did have a $500 million limitation in it, that is, $500 million above that for which the contractor was insurable or insured, as I recall.

We, in this proposal, have simply followed verbatim the existing authority that the Department of Defense has in the research and development field. That does not have a similar limitation in it.

Now, we still have pending the broader legislation which would extend beyond the research and development phase into the production and supply or construction phase.

I don't think we would have any objection to putting such a limitation in here, but we have noted that the Department of Defense does not have it, and it was not deemed necessary when Congress gave them the precisely identical authority.

Mr. QUIGLEY. In other words, you are rather open-minded on it?

Mr. JOHNSON. Yes.

Mr. QUIGLEY. And you are not suggesting it? If you were to suggest one, you wouldn't know what amount to come up with?

Mr. JOHNSON. I think——

Mr. QUIGLEY. You don't object to the idea that this committee should look into it?

Mr. JOHNSON. No, sir; we don't object to it, but I would think we would not want the amount to be less than $500 million. This is the figure, I believe, in the Atomic Energy Act, and is the figure used in the other bills now pending before the Congress. This is potentially an enormous kind of liability, and if it is to be useful, it shouldn't be too limited.

Mr. QUIGLEY. Now, I am going to shift gears again and take you back to the patent subsection. I was somewhat bothered throughout the subcommittee hearings by what I thought was the effort of certain of the witnesses from industry to panic our subcommittee into action on the ground that there was a whole phase of American industry that was refusing to take NASA research and development contracts because of the patent restrictions in the bill.

I am not convinced that this was established on the record before our subcommittee.

When you appeared as a witness, with the other NASA witnesses, neither you nor they premised your recommended changes on the basis that this patent provision was retarding the space program, but rather on the fact that administratively, the section that the Congress gave you was a pretty tough one to handle and that you did have some real difficulties trying to work out satisfactory clauses in your contracts, particularly when the same contractor was doing business with DOD, on an almost identical project.

Now, the point I want to make is this: Your recommendations were submitted to the subcommittee, and the subcommittee in their wisdom have proposed certain changes. They have spelled out a rather detailed statement of what the subcommittee, or the majority of the subcommittee, intended by these changes and by this amendment.

The question that bothers me is, giving full credit to the subcommittee for effort and recognizing their good intentions, if the patent

section were amended along the lines suggested by the subcommittee, would we, in fact, hand you an administrative monster that would be much more difficult to adminster than the present provisions in the bill or in the law?

Mr. JOHNSON. I would like to go back for a moment and comment on some of your earlier remarks, if I may. It is true that in our testimony we did not bear down on the hindrance which the patent provision was causing to the Nation's space effort, because this is a very difficult thing to document in detail.

We had had a number of reports of companies that were unwilling or reluctant to do business with us, but it was difficult to pinpoint actual cases where a project had been held up.

That was the burden of my testimony, I believe, last August, when I first appeared before the subcommittee on this subject. Since then we have had some additional experience and the subcommittee's report does list several cases in which we have actually encountered real unwillingness on the part of the contractor to do business with us. Just recently, within the past week, we have addressed another letter to the committee citing a current case, where we found it impossible to carry out a project in the most desirable fashion because of the unwillingness of the contractor to accept our patent provisions.

Mr. FULTON. Who was that?

Mr. JOHNSON. It is a small company down in Texas, I am sorry, Mr. Fulton, I don't have the name.

Mr. FULTON. It is a shame. I would like the name of the company put in the record at this point.

(The information requested is as follows:)

Gravity Research Corp., 6606 North Lamar, Austin 5, Tex.

Mr. JOHNSON. We did address a letter to the committee supplementing our previous correspondence since we undertook to keep you advised of this kind of thing. But now so far as the bill itself is concerned, the only substantial addition to what we in NASA had recommended is the second sentence in section 305(a). We don't find that sentence to be at all objectionable.

It requires that:

In all cases such provisions shall reserve to the United States not less than an irrevocable, nonexclusive, nontransferable, royalty-free license for the practice of such invention throughout the world by or on behalf of the United States; and the reservation of such a license shall be deemed to provide for rights in inventions in a manner sufficient to protect the public interest and the equities of the contractor as required by this subsection in any case unless the retention or acquisition by or reservation to the United States of a greater right (1) is required under any other law of the United States or (2) is determined by the Administrator to be required in the interest of the national security or the general welfare.

Mr. QUIGLEY. And with respect to subsection 2, the subcommittee then went on for a page and a half to tell you what it meant?

Mr. JOHNSON. Yes, sir.

Mr. QUIGLEY. Now, can you take what the subcommittee intended and administer it in advance of the contract?

Mr. JOHNSON. In some cases it would be difficult for us. I don't think, though, that it would create difficulties comparable to those that we have under the present law. If we look at the bill from the purely legal point of view, it would seem to be fairly simple to admin-

ister. It requires that there be a positive determination by the Administrator that something more than a royalty-free license is required in the interest of the national security or the general welfare.

The statement of intent, I would conclude, was put in here as a guide to the Administrator in carrying out his statutory obligations. I think it is fortunate that it was done this way, rather than attempting to write these various guidelines into the law, because then we would have been under the requirement of making a positive statutory finding and determination on a number of difficult things every time a contract came up.

As I read the bill and the committee's proposal, we would not be required to make that kind of a formal statutory finding and determination on these various items listed on pages 34 and 35 of the subcommittee's report, but we would be guided by those in determining whether something more than a royalty-free license is required.

If we had to make a formal record on each contract before we entered into it, that A, B, C, D, as listed here were or were not present, I think we would be in great difficulty, because it would require omniscience on our part concerning the course that invention would take under a contract that would be beyond human capabilities, I believe.

I think, though, that we would anticipate that this committee would be calling on us to account from time to time on the basis of experience, hindsight, to see whether we had used the best judgment possible under the circumstances. With that understanding, I would not find it too difficult.

Mr. QUIGLEY. This is one of the things bothering me; the declaration of intent is set forth as a guide to help the Administrator do the thing right. I am not really so sure that the subcommittee hasn't come up with a much more effective club for the Congress to use on an after-the-fact basis, to apply in those instances where the Administrator has guessed wrong. I think the Congress is going to be in an ideal position to do some Monday morning quarterbacking, because we attempted to say specifically what the Administrator must consider, and if, after the fact, it turns out it didn't work out favorably, the Administrator will be in an impossible position. He won't be able to convince a committee of the Congress that he did, in fact, make the right choice. He'll be asked: "Why couldn't you have anticipated that this is the way it was going to go?"

Mr. JOHNSON. I think we would just as soon take our chances on that kind of Monday morning quarterbacking as the kind we are bound to have under the present law anyway, Mr. Quigley.

Mr. FULTON. Would you yield?

Mr. QUIGLEY. Yes.

Mr. FULTON. On that particular point that you have been developing with Mr. Quigley, I think it is an important point on our setting up of procedures for patents.

The counsel of our subcommittee, Mr. George Feldman, has pointed out to me something that I think should be added on at this point in the record, and that is this: If the guidelines were not established in the report, as recommendations to the Administrator, but rather, were put in the act as definite statutory requirements, that raises this question. Wouldn't NASA then have to set up a costly division, con-

sisting of examiners, people who would do investigating work, people who would really be either judges or deciders of the statutory question?

And then NASA would have to keep very full records of your decision, which would be quite a costly and an involved setup within your agency? Isn't that right?

Mr. JOHNSON. There is no question about it. If these were made part of the statute it would create, I would think, an almost impossible administrative problem for us.

Mr. FULTON. And become an expensive matter as well as a very involved matter of administration, is that not right?

Mr. JOHNSON. Yes, sir.

Mr. FULTON. Thank you.

Mr. QUIGLEY. Mr. Chairman, I have only one more question. Mr. Johnson, do you visualize in the subcommittee recommendation on the patent section any possibility for the Administrator, himself, to do a little Monday morning quarterbacking and recoup lost ground, if he enters into a contract and the patent provisions provide for the title of any invention that might come along, in the inventor, and suddenly they hit the jackpot and come up with the cure for cancer, which was the one that kept cropping up in our hearings, is it possible under our provision for the Administrator to say: Oops, I made a mistake. And to go in and try to undo the damage?

Mr. JOHNSON. It would not be possible, of course, if the contract provisions didn't take care of it.

Now, it might be possible to develop a contract provision which would categorize certain possible inventions by virtue of the use to which they might be put of the kind you mention. In that case, such a general definition or categorization in the contract clause would apply to those inventions and title would be reserved to the Government by the contract itself.

For instance, to be specific, you might write a clause which said that if any invention is developed which is useful or indispensable for the treatment of a particular disease, title to that invention will vest in the United States.

Of course, if you had that in the contract clause, there would be no problem of the Administrator Monday morning quarterbacking, But if you didn't, we would be bound, of course, by whatever contract provision was used.

If the contract provision unqualifiedly said that title to all inventions produced in the course of performance of the contract would be in the contractor, we couldn't amend that, except by negotiation with the contractor.

Mr. QUIGLEY. And, of course, if you were able to develop such a recapture clause, you would then be faced with the same problem you now face under present law, where you would find contractors resisting it. They would take the position that previously, NASA wouldn't give title to us immediately, but might waive it to us in the future; whereas, under present law NASA gives title to us now, but in the fine print NASA reserves the right to take it back.

Mr. JOHNSON. If the clause I was mentioning were to be broad enough to have that effect, that would be true. I assume, if that were done—I am not going to say that it is feasible to develop that kind

of a clause at this point—but if it were done, it would impinge on fairly narrow categories of inventions.

Mr. QUIGLEY. If you thought you were near a breakthrough in something, you might come up with such a clause.

Mr. JOHNSON. Yes. The difficulty at the present time is that the contract clause reserves for future determination, by the waiver process, the entire question of title versus license; and the contractor has no assurance at the time he enters into the contract that he will retain title to any inventions. Certainly, the kind of contract you and I are now talking about would not present that kind of a problem.

Mr. QUIGLEY. I have no further questions.

Mr. FULTON. May I just finish on that one point?

Mr. MILLER. Well, I know this is important, but the Patent Subcommittee has been through all of this. I would like to get Dr. Glennan and Dr. Dryden out of here.

Mr. FULTON. This will just take 1 minute.

Mr. MILLER. All right, I will recognize you for 1 minute with the permission of Mr. Van Pelt.

Mr. VAN PELT. Yes, sir.

Mr. MILLER. Go ahead.

Mr. FULTON. I understood we were not under the 5-minute rule.

Mr. MILLER. No, let's get it straight, we are going down the committee in an orderly manner. You have had your time.

Mr. FULTON. We have spent 20 minutes with one person and I didn't complain.

Mr. MILLER. Go right ahead.

Mr. FULTON. Do you want me to or not?

Mr. MILLER. Yes, go ahead.

Mr. FULTON. If there is any objection to it, I would rather not.

Page 7, subsection (B)(14), "to acquire releases, before suit is brought, for past infringement of patents." That brings up the question whether under (A) and (B) that you see above, under 13, there has been a limitation put of a $5,000 claim.

My point is this: Under 14 it is really in effect settling claims by taking licenses. Should not, then, the $5,000 limit, likewise, be put under 14 as well as under 13 (a) and (b)?

Mr. JOHNSON. Mr. Fulton, I think if it were, the result would be to throw all of the major infringements into litigation.

Mr. FULTON. I am not saying that. I am saying that you really are going to get in touch to report the facts and circumstances to Congress for its consideration when you are settling a damage claim by taking a license and it is a past infringement, and is in excess of $5,000. If you look up under 13(b) you will find that is the limit over which you are to report to let Congress hear about it.

Now when we are possibly going to settle large claims for infringement, I think when it gets over a certain amount, as has been set here, $5,000 for damages, that when it is equivalent of setting off a damage claim by the U.S. Government taking a license, that we should then have the same rule apply.

Mr. JOHNSON. I would like to say several things. Thirteen is really for tort claims. Now the language may be broad enough to take care of past infringements, also, when they are less than $5,000, and that would mean also that we could report to the Congress claims for more

than that. We do have another section that is involved here and that is 203(b)(3), which says:

to acquire (by purchase, lease, condemnation, or otherwise), construct, improve, repair, operate, and maintain laboratories, research and testing sites and facilities, aeronautical and space vehicles, quarters and related accommodations for employees and dependents of employees of the Administration, and such other real and personal property (including patents), or any interest therein, as the Administration deems necessary within and outside the continental United States.

What you frequently get involved in is a situation where someone claims infringement of a patent and, upon investigation, determination is made that a patent is being infringed and that future activities will probably continue to infringe the patent. In that case we can, under this section, acquire a patent license for future use, and, in the process, include in the consideration, without limitation, compensation for past infringement.

That is the ordinary way in which this is done.

Mr. FULTON. That is right. My only point——

Mr. JOHNSON. This would take care of us except in the cases where we don't contemplate future use. It is quite possible that the claim for infringement may come up after our use is entirely completed. We think that in that case we ought to have the same kind of authority, without any dollar limitation, that we have in the case where a continuing infringement is contemplated.

The military departments, incidentally, have this authority. While they, too, are limited by a dollar amount in the administrative settlement of tort claims, they have unlimited authority, just as we are asking, in the administrative settlement of past patent infringements.

We are only asking for identical authority.

Mr. FULTON. Then you would not want to report to Congress when you were settling claims for damages for past patent infringements that might have taken place, when they go over the $5,000 amount; but you are willing to do it where there has been an injury and a settlement of a damage claim is made over $5,000?

Mr. JOHNSON. This is correct and this is simply a reflection, I think, of an historical development, where Congress has always restricted tort settlement authority.

Mr. FULTON. The purpose in going over this again was to get an answer from counsel.

What does counsel think of that now? Would you have a $5,000 limit, and above that, require that a report be made to Congress when they settle a claim for past patent infringement as they do in the case of damages or torts?

Mr. DADDARIO. Mr. Feldman could give us that answer later on.

Mr. FELDMAN. I don't know the answer.

Mr. FULTON. All right.

Mr. MILLER. You are asking him to give his opinion without giving him an opportunity to think about it.

Mr. FELDMAN. It would be a curbstone opinion.

Mr. MILLER. Mr. Van Pelt?

Mr. VAN PELT. No questions.

Mr. MILLER. Mr. Hechler.

Mr. HECHLER. Dr. Glennan, as the chief space adviser to the President, you mentioned you saw him about once every 2 weeks. Who

sees the President so far as possible military utilization of space is concerned?

Dr. GLENNAN. I would presume that it would be the Secretary of Defense or possibly Dr. York, from time to time.

Mr. HECHLER. That would also be the case so far as possible military application of big booster engines?

Dr. GLENNAN. That is correct.

Mr. HECHLER. What concerns me here essentially is not your own organization, because I believe that you have done a masterful job in clarifying the administrative and managerial functions within NASA. But what concerns me is the area above NASA and the Department of Defense. I think that there is danger here that you have created two rather independent organizations which provide the climate for conflict and it deeply concerns me. The abolition of the Space Council and the abolition of the Civilian-Military Liaison Committee means we don't have now a real mechanism for coordination or leadership. We are creating greater independence on the part of these two organizations which seem to me to invite conflict, and at the same time we are not protecting the power of the President to resolve that conflict because we are creating more conflict.

Dr. GLENNAN. Mr. Hechler, I think your point of greater independence is not really the case. We are no more independent than we were before. Actually, there is a direct line to the President in these matters. We provide in the proposed amendments that:

> The Administration and the Department of Defense shall advise and consult with each other on all matters within their respective jurisdictions relating to activities involving the utilization of space and research and development connected therewith and shall keep each other fully and currently informed with respect to such activities.

If we cannot agree on a conflict between us, either one of us may take it to the President.

Mr. HECHLER. You would not agree that you are creating more opportunity for conflict and more climate for conflict?

Dr. GLENNAN. I think not at all.

Mr. HECHLER. What is the function of Dr. Kistiakowsky going to be after these amendments are passed?

Dr. GLENNAN. I suspect just exactly what it is now, sir.

Mr. HECHLER. It will not change at all?

Dr. GLENNAN. No; I think he continues to be the responsible scientific adviser to the President.

Mr. HECHLER. And how would you define his relationship to problems which NASA has?

Dr. GLENNAN. I keep in touch with Dr. Kistiakowsky from time to time. It is an informal contact, to be sure. I meet with him on a regular basis as a member of the Federal Council of Science and Technology. That group meets once a month. But in that group we do not normally take up specific organizational problems.

The kind of discussion that I would have with Dr. Kistiakowsky might be exemplified by one which is before me at the present time. In connection with his work with the President's Science Advisory Committee, there has been a question raised as to the manner in which we are doing our planning in one particular area. He asked me about this and I have invited the interested members of the President's Science Advisory Committee to talk with us about this.

It seems to me this is a direct line of communications with no intervening committees that are trying to second-guess what we are trying to do.

Mr. HECHLER. Do you think that the Civilian-Military Liaison Committee has been a failure?

Dr. GLENNAN. I don't think the Civilian-Military Liaison Committee has been a failure, Mr. Hechler. I just think it is not a useful device in a program which is as broad as this, where there has to be so many links of information and coordination as there need to be between ourselves principally and the Department of Defense.

Mr. HECHLER. What disturbs me is that by providing additional links you are, in a sense, covering up the nature of the relationship. If you had one committee it would clarify the nature of that relationship and perhaps bring into that committee some of the most important problems of coordination. You mentioned that the Committee has been unnecessary, cumbersome, and unworkable. Yet, I think that we have to consider here that the American people have to have an understanding of what is going on, as well as having it go on to satisfy you personally——

Dr. GLENNAN. Oh, yes.

Mr. HECHLER. And the Secretary of Defense or the President.

Dr. GLENNAN. Could I ask Dr. Dryden, a member of that Committee, to speak to your question?

Dr. DRYDEN. May I speak, since I have been a member of the Committee? The members of the Civilian-Military Liaison Committee have been able to discuss problems which occur at their corresponding levels in the two organizations; they have not been able to take up major issues which only Dr. Glennan and Secretary Gates can settle. In other words, neither the Administrator nor Secretary Gates is willing to delegate to junior people settlement of major issues.

Mr. HECHLER. Why don't you create then a committee that is able to settle major issues?

Dr. DRYDEN. The Committee is the Secretary and the Administrator who do meet. I don't know that you need to establish that formally as a legal mechanism. It is required in the law that the Secretary of Defense and the Administrator shall consult and keep each other advised, and, if they can't agree, to take their disagreements to the President.

The Committee has dealt successfully with a number of matters, but I would like to point out that most of them have been matters that were settled between individual members of the Committee, rather than, if I might describe it as such, as a committee action.

For example, one of the matters which has been before the Committee is means of coordination. In other words, they have looked into this question of coordinating and being sure that proper channels are provided. One of the channels for long-range research activities is our research advisory committee and the military members of the Civilian-Military Liaison Committee have made the nominations of people from their service. Each service made their own nominations. This was not a committee action; the Navy people named Navy members, Army people Army members, Air Force people Air Force members. The same thing is true of military liaison officers. The Air Force maintains offices at our research center with

an officer there who expedites visits, makes arrangements for technical discussions, procurement of special equipment, and so on. At a different level are the project teams that we have spoken about. In some cases a few of these have involved more than one service, but usually not. If it is a navigation satellite it has involved the Navy; if it is a communications satellite it has involved the Army and so on.

The committee, as a committee activity, has been briefed from time to time on specific programs.

Some examples are X–15, Dyna-Soar, Mercury programs, VTOL, STOL aircraft, space science program, booster program, and so forth. Many of those meetings have been expanded to have other attendees from the Department of Defense, so that they become briefings, and we have put on special briefings from time to time, as suggested by the CMLC, to a much broader circle than the members of the committee.

The CMLC has taken up and been involved in various agreements between NASA and the military. These also turn out to be rather individual to the service. We have an arrangement, for example, with the Air Force and the Navy—they are separate agreements—with respect to the transfer of aircraft to NASA, for use in some special flight projects. In these cases the services usually do not want to transfer title to the aircraft to NASA. This is provided for by a written agreement between NASA and the particular service. We have arrangements by which NASA pilots can fly an Air Force airplane or a Navy airplane and be issued the proper kind of identification and be provided with supporting services. This again is individual to the service. There is one agreement which is with the Secretary of Defense. This is because the Secretary of Defense wished to have a uniform agreement on the assignment of military personnel, conditions under which people are made available to us for working in our laboratories.

Another area of discussion in CMLC has been support, for example, of the operation of Fort Churchill.

This arose out of the IGY. The Army was the executive agent. It has turned out finally that this matter is being handled practically, by negotiations between NASA and the Army. The committee listened to the problem and provided some suggestions, but it actually came down to an activity on the part of one individual service.

The Mercury support started with the individual services—Air Force for tracking, Navy for recovery. At our own instigation, and with the concurrence of the Department of Defense, we wished a single point of contact. So the Department of Defense has set up a group under the Joint Chiefs, headed by General Yates, as our point of contact on Department of Defense support for project Mercury. He has an assistant from the Navy who actually commands the recovery forces. This problem was handled by negotiation with the Office of the Secretary of Defense.

I think I have covered most of the principal items which would show you the type of thing that CMLC has dealt with.

Mr. HECHLER. Yes. Once again I would like to say I think the area of danger is up in the administrative ionosphere where people can't breathe, but they have to act. I want to associate myself with the

remarks of Mr. Quigley that somebody has to be in charge here, or we will be coordinated to death. I will pass on to you, perhaps, for your use, a little two-line couplet of Alexander Pope:

For forms of Government let fools contest, what e'er is best administered is best.

Of course, whatever is best administered is best. But I believe, I still have a feeling that we are creating an atmosphere of conflict here and what we need to do is to protect the President's power and the power to act.

Dr. DRYDEN. May I continue along this line? It seems to me that in a way the public is overlooking the fact that space is another medium. We have land, sea and air. We have no one who runs all the aircraft. The FAA, the CAA, the old CAA, the military airplanes, the Army and the Navy were all involved. We don't think of setting up one individual in the Government to run all aircraft. We don't think of setting up one agency to control the sea in the Federal Government. You can find no one person who controls all operations in the sea. There is the Maritime Commission on commercial travel, there are the military vessels in the sea. I would compare the NASA and the Department of Defense in the use of space with the Maritime Commission in the civilian use of the ocean, with the military on the defense use of the ocean. The Department of Defense is going to use space for defense purposes. NASA has a civilian mission of exploiting it for civilian purposes and exploration of space. I don't, myself, see that you get anywhere with one man supervising everything in space any more than you do with one man supervising all communications, all ships, communications, use of the ionosphere, no one person controls all of this. It seems to me that we, ourselves, in our discussions in the press and elsewhere, are implying that somehow space is something which is narrow and controlled by one person, whereas space is going to be used very widely by many groups before we get through with this. By the time you get further along, the Weather Bureau will be interested in space, and many other agencies of Government. And I think that a monopoly, so to speak, in this area makes no more sense than a monopoly on land or sea.

Mr. MILLER. Mr. Daddario?

Mr. DADDARIO. Mr. Riehlman, I think——

Mr. QUIGLEY. He was heard.

Mr. MILLER. Mr. Riehlman had time very early in the game when there was only six people down here.

Mr. DADDARIO. Dr. Glennan, on March 1 you announced the appointment of Dr. Clark Randt as the Director of the Office of Life Sciences.

Dr. GLENNAN. Yes, sir.

Mr. DADDARIO. At the same time you stated the two objectives of space research, to provide for research, development and training, in the scientific and technological aspects of manned space flight and to investigate fundamental biological problems relative to space environments including research for extra-terrestrial life.

Now, where will these facilities be built?

Dr. GLENNAN. Presently, we have discussed building a small research establishment, either on the grounds of Goddard Space Flight

Center or perhaps at the National Institutes of Health. There are reasons for considering one as against the other. For instance, the close association between the physical scientists, worrying about space flight, and satellite flights, that sort of thing, with the life scientists, is to be desired. On the other hand, there is to be considered the community of interest of the people working in our life sciences program, particularly in the bio-sciences area, with their colleagues in life sciences in other fields.

Actually, Mr. Daddario, we do not plan to build such an establishment immediately.

Our initial activities in that field will be the development of a program of research in which we will support activities—research activities—on college campuses, medical schools, and in the laboratories of the military services, particularly in the latter case in those areas where bioastronautics is involved.

Mr. DADDARIO. Well, the reason I asked the question is because I share Mr. Quigley's and Mr. Hechler's concern over having somebody cut the lines, and I don't agree with Dr. Dryden that because there are a multitude of agencies now in all fields that this is necessarily the right answer. We are always trying to cut down the number and size of agencies, and certainly we need somebody to direct us to the point where weather people can get into space and where communications can come in. I think somebody has to take the necessary steps to get us there.

Now, we have air medical research centers at Wright Field, and Brooks Air Force Base, Holloman, Johnsville, and through the testimony that has been given to the committee, it appears that we already have facilities for just the things you are talking about now. Are they going to be used? How will they be used? Will you give your requirements to them? Will their facilities that have been developed and the training that they have had over the course of time be properly utilized? Is it necessary even to have a small medical center of your own? Cannot these people, who have already spent millions of dollars, be used for this particular purpose? Brooks Air Force Base has spent over $10 million; there must be $20 million or better in these four establishments.

Dr. GLENNAN. They will be, Mr. Daddario.

The point is, however, that if we are going to be concerned with the exploration of space, we are going to be concerned with the life sciences in space. We are not going to be able to monitor, to usefully support work in other areas, in other laboratories such as the military laboratories, except we have competence on our own staff. The only way we will get competence on our own staff is to have a small research establishment where the people that we will be using in this area will also have their own laboratories. This is not a large buildup, although I quite realize the fear—a fear I share with you—that once you start something it begins to grow. We don't envision this at all. Actually, in the use of the centrifuge at Johnsville, the monkey colonies at Brooks, the School of Aviation Medicine, these people have been particularly concerned with the problems of stress in flight, some sensory deprivation, that type of thing. They have not been concerned to any great extent with really basic studies of the biological type. And we think we must get into this area. There

is no one doing this work. We would certainly expect to support research, even in this basic area, at those establishments where they did have the men and the equipment.

Mr. DADDARIO. When you say you should have competence in your own agency, I tend to agree, and yet it is this desire for competence in each agency which builds up large departments, and results in duplications and overlapping areas of development. This seems to me to be not only wasteful, but extremely inefficient. I have heard testimony here regarding the development of research in this area, for example, the use of monkeys for outer space development, and I just can't see that it makes much difference whether the Navy or the Army or who finds out how to keep a man alive in outer space. Why should NASA need the additional competence?

Dr. GLENNAN. It is really not a desire for competence, as we were putting it a moment ago, Mr. Daddario. We think it is a responsibility that we must accept under the law which establishes us as a responsible agency for space exploration.

The life sciences are involved. It seems to me almost impossible to simply say to the biomedical organizations in the Army and in the Navy and in the Air Force—"You worry about the life science area in space." They won't know where to start. They know what to do and they have known what to do as aircraft have become faster and have flown to greater heights. They have had to qualify their pilots. They have had to provide the kind of environmental training and to determine the degree to which a pilot can withstand unusual stresses. This, I think, will continue right through into the astronautics field. We are actually using, as you may know, military medical people, largely, in Project Mercury at the present time.

But in the broad sweep of the life sciences, I think there isn't any question but someone has to do this and we believe that we can't duck that responsibility, sir.

Mr. DADDARIO. Dr. Glennan, this is one of the problems which accentuates my fears in this whole area of bringing things together. Frankly, I cannot see why these four facilities cannot take the next step. I can't see why you couldn't hand them a requirement; why there should be so much difficulty in their finding a place to start. I think they already have started in this area. Why couldn't they carry out experiments within these facilities that you would request?

It seems to me this is an additional point that causes the fears that Mr. Hechler and Mr. Quigley have already brought out. Frankly, I feel that it is duplication and waste, not only of facilities, but of funds. There ought to be more reason, from your standpoint than that they would not know where to start, or that they are not making progress in this area. I feel they are, and I think it is progress which you should take advantage of.

Dr. GLENNAN. Mr. Daddario, we are taking advantage of it, every day and every hour that we are in business. It is a fact, however, that their activities are not as broad as they will need to be in exploring the basic fields of biology and the other life sciences here.

Mr. DADDARIO. But isn't that the place for them to logically broaden themselves?

Dr. GLENNAN. They may not have the competence there. They have been concerned with flight problems.

Mr. DADDARIO. Well, then some of the testimony I have heard, I must have misinterpreted, because I have heard testimony as to their desire to develop a capacity and a competence with respect to future efforts into space.

Dr. DRYDEN. Let me try to clarify this, Mr. Daddario. They are concerned with what many of us call bioengineering, the engineering problems of getting a man in space. You are talking mainly about what is called bioscience, the underlying scientific work which is applied in the bioengineering. This is not something which the present staffs of these laboratories can do. Now, if you want to subdivide the space responsibility and assign the total mission to one of these laboratories, that is another matter. We are using these laboratories. I think we have been the principal user of the facilities at Johnsville for the last year. I think in the X–15 and the Mercury program we have probably had the major fraction of the hours and services of that staff. Every one of these animal flights that we make are done with the support of the service laboratories. The service doctors are the ones who are controlling the medical aspects of Project Mercury. We call that bioengineering; that is the practical side of the man in space.

This is fine for Earth satellite orbits of a short time. If you seriously think that we ought to put a man on the Moon, there are many, many other problems which will have to be attacked on a much more fundamental basis before you are ready to do the engineering. Let me take one of them: It has been suggested, of course, since the amount of food, oxygen, water needed by a man is very great, once we start going long distances the requirements just cannot be met, we will have to get one of these systems which takes the carbon dioxide that we expel and use it under photosynthesis, light of the sun, to generate oxygen. One of the engineers that I was—well, I guess he was a biologist in this particular case, said: "I would hate to risk my life on any living thing, such as algae, as the basis of a life support system. They might get a disease and die, then there would be no recourse, whatever." All I am quoting this for is to illustrate that there are basic biological investigations that are going to have to be made if we take seriously sending man to the Moon and to the planets. This bioscience aspect is the thing for which we bring in Dr. Randt—who is a neurologist, is a medical doctor and has experience in biological research—to organize activities at universities along that line.

Now, we are going to continue to use the service laboratories. The estimate is that three-quarters of our effort in this field will always be in the universities and service laboratories. I don't know whether this makes it any clearer or not.

Mr. DADDARIO. It is helpful.

Mr. Chairman, I suggest we get some of the people in who are in charge of these other facilities to see just how they feel about it.

Dr. DRYDEN. General Flickinger could give you a very wide view of this.

Mr. MILLER. Will you make note of that?

Mr. DADDARIO. That is all.

Mr. MILLER. Before we adjourn, Dr. Glennan and Dr. Dryden and Mr. Johnson, I want to thank you for being here, and being so patient with us.

Dr. GLENNAN. Mr. Chairman, I know you are going to hear a good many other witnesses on the bill.

I would respectfully request that you might ask us to come back again if there are matters where there needs to be clarification. We would like the opportunity, really, to debate some of these matters if it becomes necessary.

Mr. MILLER. Thank you.

The committee is adjourned until tomorrow morning at 10 o'clock.

(Whereupon, at 11:43 a.m., the committee adjourned to reconvene at 10 a.m., Thursday, March 10, 1960.)

TO AMEND THE NATIONAL AERONAUTICS AND SPACE ACT OF 1958

THURSDAY, MARCH 10, 1960

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND ASTRONAUTICS,
Washington, D.C.

The committee met at 10 a. m., Hon. Overton Brooks (chairman) presiding.

The CHAIRMAN. The committee will come to order. We are a little late starting this morning because of the inclement weather.

I want to take this opportunity to congratulate the committee and express my appreciation to all the members of the committee for presenting a unified front in the handling of the authorization bill. I think we can all reach around with our right hand and pat ourselves on the back for getting the bill through with only 10 votes against us.

Mr. McCormack was especially helpful, and everybody on the committee cooperated to make possible this result. I think it is a good bill and we ought to defend it, too, if and when it comes back from the Senate with amendments.

Now this morning we have the opportunity to hear Mr. W. M. Holaday, who is Chairman of the Civilian-Military Liaison Committee. I consider Mr. Holaday a key witness for us in this particular hearing. Later on we may hear from Mr. Franklin W. Phillips, former Acting Secretary, National Aeronautics and Space Council.

Now, Mr. Holaday, you have a prepared statement.

Mr. HOLADAY. Yes, sir.

The CHAIRMAN. Would you proceed with your prepared statement?

Mr. HOLADAY. Very glad to, Mr. Chairman.

The CHAIRMAN. We are certainly glad to welcome you. We are always glad to have you before this committee.

Mr. HOLADAY. Thank you, sir.

STATEMENT OF W. M. HOLADAY, CHAIRMAN, NASA–DOD CIVILIAN-MILITARY LIAISON COMMITTEE; ACCOMPANIED BY W. J. UNDERWOOD, ASSISTANT TO THE CHAIRMAN AND SECRETARY, CMLC

Mr. Chairman and members of the committee, I appreciate this opportunity to appear before you today as a witness in your hearings on the legislative changes to the Space Act of 1958 (H.R. 9675). In this respect, I intend to confine my remarks to the role of the Civilian-Military Liaison Committee between the National Aero-

nautics and Space Administration and the Department of Defense plays in the advancement of the space program.

Before I describe the operations of the committee and the part it plays in our space effort, I think it would be worth while to review briefly the formation and function of the committee.

The Civilian-Military Liaison Committee was created by section 204(a) of Public Law 85–568, usually referred to as the Space Act of 1958. It stipulated that the membership be made up of a Chairman, appointed by the President, one or more representatives from the Office of the Secretary of Defense, one or more representatives from the Departments of the Army, Navy, and Air Force, and an equal number of representatives from the National Aeronautics and Space Administration. The objective of the Committee was set forth in section 204(b) which states:

> **The Administration and Department of Defense, through the Liaison Committee, shall advise and consult with each other on all matters within their respective jurisdictions relating to aeronautical and space activities and shall keep each other fully and currently informed with respect to such activities.**

In turn, these two paragraphs of section 204 were used by the Administration and the Department of Defense in preparing a charter for the Committee, covering its objectives, functions and authority, membership and procedures. This charter referred to and entitled "Terms of Reference—Civilian-Military Liaison Committee to the National Aeronautics and Space Administration and the Department of Defense" was approved by the President on October 29, 1958, and on June 30, 1959, a revised Terms of Reference was approved by the President.

As the Civilian-Military Liaison Committee was set up to deal with matters between NASA and DOD, it had no formal relationship with other Government agencies such as the Atomic Energy Commission, the National Academy of Sciences, the Federal Council for Science and Technology, and the National Science Foundation. All of these agencies and others are partially involved in the Nation's space program.

By the Space Act of 1958 and the attendant Terms of Reference, the Liaison Committee has no other duty than providing a channel of advice and consultation between NASA and DOD. As a Presidential appointee serving at the pleasure of the President, I report to him; but in the normal course of operation, I, as Chairman, report the findings, conclusions, and the recommended course of action emanating from the Committee to the Administrator of NASA and to the Secretary of Defense.

Since the passage of the Space Act on July 29, 1958, the Civilian-Military Liaison Committee has met 13 times. The first meeting was held on November 25, 1958, and the last, on December 8, 1959. For the most part, the items of business brought before the Committee at the formal meetings are of the information type to keep the Committee, as a whole, informed on the activities of NASA and DOD in the fields of aeronautical and space research and development. The formal actions of the Committee are few in number and consist of recommended actions to the Secretary of Defense and the Administrator involving (1) the priority for the manned satellite, Mercury, and the 1½ million pound thrust rocket engine programs,

(2) the joint sponsorship and utilization of the Upper Atmosphere Rocket Research Facility at Fort Churchill, Canada, (3) the establishment of a national program for satellite and space vehicle global tracking, data acquisition, and communication facilities, (4) the program objectives of the Dynasoar I in relation to similar objectives of the X–15 and project Mercury programs, and (5) a procedure for detailing military personnel for duty with the National Aeronautics and Space Administration.

As I mentioned earlier, the Committee is only one of the channels for insuring the exchange of information between NASA and DOD and as indicated by the above formal actions the role of the Committee has been of relative minor importance. This status of the Committee, I might add, had caused some concern on the part of the members.

It is my belief that normal project activities, of mutual interest to both agencies, can best be conducted at the working level provided there are no policy issues or decisions involved. Where these do occur, several channels have been available to resolve the issues. These channels include the various management levels of NASA and DOD including the military services, the Civilian-Military Liaison Committee, and, of course, the National Aeronautics and Space Council. Actually, coordination between the agencies usually requires a decision-making capability which is the definite responsibility of management.

This Committee, because of its composition, that is, a membership made up of representatives who are subject to a higher internal authority, is incapable of making firm decisions. In this respect, I and, I believe, most of the members of the Liaison Committee recognize that, as presently constituted under the Space Act of 1958 and the Terms of Reference, the activities of the Civilian-Military Liaison Committee are limited to recommending courses of action to the heads of the two agencies for their consideration and decision. Having considered this limitation, the Committee, during its November meeting, concluded that although its formal actions were few in number it was carrying out its responsibilities in that it had continuously monitored the exchange of information and coordination between the two agencies and had found that these functions for the most part were adequately being handled by a direct agency-to-agency process. Noting the value of the day-to-day contacts between the members and their designated staff assistants and the continuing need for a potential investigative and advisory body between the two agencies, the Committee members agreed that the Civilian-Military Liaison Committee should continue to function. The President's recommended legislative changes, however, include the dissolution of this Committee.

Section 309, which is part of the recommended legislative changes of H.R. 9675, relates to the utilization of space for military purposes including the research and development of weapon systems utilizing space vehicles, the development of new launch vehicles, the exchange of information, and the settlement of disputes. This section basically covers the functions that were assigned to the National Aeronautics and Space Council, and the Civilian-Military Liaison Committee, both of which are to be eliminated under the suggested legislation (H.R. 9675).

In the President's message to the Congress recommending that the Congress enact certain amendments to the National Aeronautics and Space Act of 1958, he points out that a single civilian-military program does not exist and is in fact unattainable.

We, therefore, have NASA responsible for planning and managing a program of nonmilitary space activities, and DOD responsible for a military program to conduct research and development work on space-related weapon systems and to utilize space for these weapon systems. While the end objectives of these two programs are distinct and different, there are many parts of the program that are similar in nature.

For example: Launch vehicles (section 309(b), H.R. 9675), guidance tracking, and data read-out, launching facilities and auxiliary space power. Considering the total resources involved in these common areas, I believe that a procedure should be established, either through administrative or legislative action, to insure the efficient utilization of our resources in these quickly expanding programs related to space and the continuing programs within the atmosphere. Either the Administrator of NASA or a suitable person from the DOD should be given the responsibility to see that our resources (equipment, facilities, utilization of manpower, and exchange of data and information) are efficiently used.

That concludes my statement.

The CHAIRMAN. Thank you very much, Mr. Holaday.

I want to say that I think it is an excellent statement—I would like the absent members of the committee to read it. Mr. Yeager, please see that all the members who are absent are given a copy of this statement.

Mr. YEAGER. Yes, sir.

The CHAIRMAN. To look over. It is an excellent statement.

I want to ask you a question or two, sir. To begin with, your statement refers to the fact that the President recommended the abolition of your committee, but your committee previously recommended continuation of the committee, with certain changes; isn't that right?

Mr. HOLADAY. Our committee discussed the question of its value to the space program prior to any information being submitted to Congress relative to eliminating the committee.

The CHAIRMAN. And at that time you recommended that, "The Civilian-Military Liaison Committee should continue to function." Those are your words.

Mr. HOLADAY. That was the conclusion of the membership of the committee.

The CHAIRMAN. Then your committee's conclusion really is not in harmony with the President's recommendations?

Mr. HOLADAY. That is correct, that was taken from the minutes.

The CHAIRMAN. You are still chairman—do you still believe that the committee should continue to function?

Mr. HOLADAY. Sir, under its authority which it has practically none——

Mr. MCCORMACK. Assuming it is given authority, I would like to have you answer the chairman's questions.

The CHAIRMAN. Assuming we beef it up a little and give it authority, what about that, as Mr. McCormack asks?

Mr. HOLADAY. Mr. Chairman, I think you have to approach that with caution. If you give it authority you then put it, in all probability, in a management position, and if you put it in a management position it therefore would be above the Administrator and the Secretary of Defense. From a strictly working viewpoint, where people will be people, I do not believe that is necessary or possible. Now, if you are going to attempt to strengthen in any way its coordinating functions, I think we should approach it more as a watchdog to see that information is exchanged and that the programs are thoroughly kept in order.

If you, however, put it in a watchdog position of trying to make decisions and override the two agencies, then I don't believe you have a workable system.

The CHAIRMAN. Don't you think, too, that it would be well for your committee to include such kindred work as liaison with the other agencies to which you refer, such as the Atomic Energy Commission, National Academy of Sciences, Federal Council for Science and Technology, and the National Science Foundation? Do you think it should be in liaison with those agencies, too?

Mr. HOLADAY. Well, if you will recall, Mr. Chairman, in your original Space Act of 1958, that type of coordination was carried on in the Space Council, because those people were present as members of the Space Council.

The CHAIRMAN. The administration's recommendations now are to abolish the Space Council. In the event the Council were abolished, would you put that authority in the continuing committee, the Civilian-Military Liaison Committee?

Mr. HOLADAY. Well, there is considerable question in my mind, Mr. Chairman, as to the benefit of a liaison committee and what it could really accomplish. I can't really go along with you in saying that it is necessary to put a committee, composed of members from the two agencies between the agencies. To attempt to do it would bring up this problem of authority and who is going to make the decisions. The administration, in its proposal, says that we are going to have two programs and that we will, at the decisionmaking level, get together and attempt to solve these differences. There, in my mind, is a big question.

The CHAIRMAN. I want to say this: I am not presenting any of my views now, all I am trying to do is to find out from you what your recommendations are. You have been involved in the space programs, and your wisdom on these matters is something that I would like to rely on.

Mr. HOLADAY. Mr. Chairman, I have attempted to answer that in the last part of my proposal, in that a committee has been tried but has not been successful; therefore, I am saying that either the Secretary of Defense or the Director of R. & D. or the Administrator of NASA be given this responsibility, to see that coordination is carired out. This makes somebody at the management level responsible so that he is answerable both to the President and to the Congress.

The CHAIRMAN. So that he might appoint a group in his organization to do work of your committee, to the extent it is necessary to do it?

Mr. HOLADAY. It could be done this way.

The CHAIRMAN. Rather than having an independent liaison committee, as now exists?

Mr. HOLADAY. That is right.

The CHAIRMAN. Now, let me ask you this: I notice in your statement, you refer to a separate military program and a separate peacetime use program.

In reference to the military program, you refer to research and development work on space-related weapons systems, and to the utilization of space for these weapons systems.

Now, I wonder about your reference to a system since we are working in the unknown. We are trying to develop something, yet you would have the military take over the systems. It would seem to me if you give that word "system" its proper meaning, the military would be out of almost everything, isn't that correct?

Mr. HOLADAY. I don't believe I am following you, Mr. Chairman, because the military systems and the types of satellites which they plan to put up are those of the reconnaissance, communications, warning types, which are related to the defense of the country.

The CHAIRMAN. I understand. Perhaps I am concerned over the use of the word "systems," but the use of that word gives me the impression that something is pretty well developed. Once there is ample experience, then it becomes a system; but this is after it is more or less a routine. Now, isn't that correct?

Mr. HOLADAY. Well, of course, I am quoting here, Mr. Chairman, from the President's message. As I pointed out, you have in effect two programs, one a civilian program and one a military program.

The CHAIRMAN. That is a program rather than a system, though. That is my point: A program is entirely different. Now, can you separate the space program into military and peaceful use?

Mr. HOLADAY. I don't believe I will attempt to answer that, because the President has stated that they can be separated into two programs.

The CHAIRMAN. You agree with the President on that, then?

Mr. HOLADAY. I say they can be separated as an end objective, but the similarity between the programs is far greater than anyone would think. When I say they can be separated, it is what you are attempting to do with your satellite that makes the difference. If you are operating a satellite with a secure communications system, it is a military approach. If you operate the satellite and it is not a secure communications system, then we say it is a peaceful approach.

The CHAIRMAN. Well, you have said that the end objectives might be separated, but that you would not separate them, as I understood you. You don't think they could be separated prior to reaching the end objective?

Mr. HOLADAY. I don't see why it should.

The CHAIRMAN. Now, what would you do before the end objective is reached? Would you put research and development under one agency, or would you put it under a split agency, or how would you handle it?

Mr. HOLADAY. Well, the ideal situation would, of course, have been to have had this as a one-agency proposition. In doing it this way we would have been able to better guarantee the efficient utilization of our manpower and facilities. But we have grown now to a stage that we have two agencies, NASA and the Department of Defense,

doing space work, and as General Medaris pointed out, you have probably four, because you have the three services and NASA all in the space field.

Therefore, the least you could do is to conduct the research and development and exploriation work, in one agency. As you approach the end result on how you use the satellite, whether you are going to use it for a military mission or for a peaceful mission, this can be decided at the point at which you put it into operation. It is like the KC–135 tanker, as used by the Air Force, it is on a military mission and carrying fuel, but take out the tanks and put seats in it, it becomes a transport plane which we fly around for peaceful purposes. The two are that closely related.

The CHAIRMAN. Let's see if I understand you, you would put research and development under NASA?

Mr. HOLADAY. I would not like to recommend which it should be in, but I say one agency should be doing the research.

The CHAIRMAN. Either you must put it under NASA or Defense. If you put it under Defense, would you put it under Army, Navy, or Air Force? I suppose you wouldn't want to get into that, would you, as to whether you put it under Army, Navy, or Air Force?

Mr. HOLADAY. I probably couldn't suggest the ideal solution because we haven't been able to solve this in the Defense Department yet, we still have all three services in the missile game and we still have all three services in the space game.

The CHAIRMAN. That is true.

Well, then we can agree on this: that you would put it one or the other, NASA or Defense?

Mr. HOLADAY. That is right.

The CHAIRMAN. And, of course, when the point is reached that actual manufacture in quantities is feasible, if it were a weapon, or had possibilities as a weapon, it would be turned over to the Defense?

Mr. HOLADAY. Mr. Chairman, I think you have to realize that when you get down to talking about whether it is a peaceful purpose or a military objective, we are really talking about the payload and what the payload is trying to do for you.

The CHAIRMAN. That is right, that is right. And the vehicle or the propulsion——

Mr. HOLADAY. These can probably be the same.

The CHAIRMAN. The propellant you put in it doesn't know whether it is going on a mission of war or a mission of peace, does it?

Mr. HOLADAY. That is right.

The CHAIRMAN. And it could be either. And so, until it is put into production it would not be assigned as a weapon of war?

Mr. HOLADAY. Well, that is true. As we are building boosters today and as we will build them tomorrow, all the way down through the production line we probably will not know whether that specific booster is going to be used to put up a military payload or a peaceful payload. The guidance system may be identically the same. It is the type of equipment that goes into the payload that generally determines whether it is peaceful or military.

The CHAIRMAN. What you seem to be saying is that you recommend that research and development be under NASA. Once developed, production of weapons would be under the military? That is substantially what you are saying, isn't it?

Mr. HOLADAY. Yes, sir. I am saying this because of the need for efficiency. You can carry one program——

Mr. MCCORMACK. Need for what?

Mr. HOLADAY. For efficiency.

Mr. MCCORMACK. What about preservation?

Mr. HOLADAY. I will buy that.

In other words, we are limited in manpower, facilities and brainpower and there is no need of trying to dilute this and carrying two or three programs along when we are all trying to get to the same objective. I would think one good solid energetic approach in our research and development is going to carry us ahead at a more rapid pace than when we are diluting it into several different approaches.

The CHAIRMAN. Your idea is that it would give us greater efficiency and, therefore, greater strength?

Mr. HOLADAY. Yes, sir.

The CHAIRMAN. And, in the end, would result in expediting our whole program; is that your thought?

Mr. HOLADAY. I am quite confident of that; yes, sir.

The CHAIRMAN. Well, you are a scholarly man, and I value your opinions very much.

Mr. HOLADAY. Thank you, sir.

The CHAIRMAN. I am not trying to put you in a difficult spot, however.

Mr. McCormack?

Mr. MCCORMACK. You believe that all research should be in one agency?

Mr. HOLADAY. That is my feeling, very definitely, based on my experience that we would be considerably more efficient if it was conducted in one agency.

Mr. MCCORMACK. That would put research in connection with military applications subject to the domination of NASA; wouldn't it?

Mr. HOLADAY. Well——

Mr. MCCORMACK. Just project your thoughts now, and consider the practical operation of such a recommendation. You must realize that this is a practical world in which we live. You have got to evaluate these things in the world of today, not a peaceful world, and from the angle of preservation.

Your recommendation would make the military completely subject to the domination of NASA in the field of research.

Mr. HOLADAY. Not necessarily so.

Mr. MCCORMACK. How are you going to get away from it? We are all human beings, we know how human beings act. We know that the question of power is always influential. Decisionmaking would be the responsibility of NASA, wouldn't it; that is, whether research and development should follow along military lines or peaceful lines?

Mr. HOLADAY. I would certainly not recommend that NASA have the responsibility for the particular type of payload which the military would use in their mission. This is something the military is better equipped for and they should do that particular phase of it.

But when it comes to building the booster and the guidance systems and these particular phases, or exploring space, determining the environment in which we are going to have to operate, I believe it would

be more efficient to have one program with the inputs into it that you need to get your answers, rather than to operate two separate programs.

Mr. McCormack. Suppose here is a question of propulsion from the angle of peaceful uses, for example, the peaceful exploration of outer space, or from the standpoint of military use. Who would make the decision under your proposal? Suppose there was a question of priority?

Mr. Holaday. Well, the question would come: Are they going to fight each other or are they going to try to work together as a team. As we have it set up now, very definitely they will fight each other, they will go their own separate ways and they will be competing. I don't believe that this is the best way to get the answer. I think it is better for them to work as a team. As one group is more dependent upon the other, the more dependency you have, the greater cooperation will you obtain and the more efficiency you will have.

Mr. McCormack. What you say is very nice academically, but in practical operation, things don't work that way, cooperation and everything else following.

Mr. Holaday. If we had the money and we had the manpower, it would be very nice to proceed with three or four different separate programs. We would let the Army, Navy, and Air Force, and NASA all take off on their own separate programs.

Mr. McCormack. You are of the Dr. Pickering school of thought, aren't you?

Mr. Holaday. I have read Dr. Pickering's——

Mr. McCormack. I respect him very much. Don't misunderstand me by my questions. I am trying to get the benefit of your opinion for my consideration. But you are of the Dr. Pickering school on that particular subject?

Mr. Holaday. Yes; I think I would class myself with Dr. Pickering and also with Bruce Medaris.

Mr. McCormack. All right. Well, what about putting the whole thing on the military side?

Mr. Holaday. I said I did not want to select which place you put it.

Mr. McCormack. All right, you are a witness. I am going to ask you, which do you recommend to us? I know you just shot it back to us, but you are here, a man of competence, a man of ability, and a man of experience. Would you put research in the military, and then have NASA go and consult with the military about what jurisdiction NASA would have, or would you have it vice versa?

Mr. Holaday. Well, in view of the present organization as we now have it formed, and the kind of capabilities that have been built into NASA, I, at the present time would put the research primarily in NASA.

Mr. McCormack. Now you say "primarily." That word interests me. What do you mean by "primarily"?

Mr. Holaday. My intent in using the word "primarily" was to exclude the research that has to do with the military payloads and those phases which are peculiar to the defense problem.

Mr. McCormack. You confine it again to payloads. What about research in connection with other military activities?

Mr. Holaday. We are now dealing with space and space vehicles, not——

Mr. McCormack. It is going to have a very important effect, though, won't it?

Mr. Holaday. I probably am not following you there.

Mr. McCormack. Well, you remember the select committee of which I was chairman. We reported out a bill which provided for a much stronger liaison committee than finally became law, didn't we?

Mr. Holaday. The House version, as I recall, where you set up the liaison committee, gave the committee some authority. In the law as it was finally passed by Congress, you eliminated practically all of the authority from the liaison committee.

Mr. McCormack. Practically all the authority was eliminated?

Mr. Holaday. All the what?

Mr. McCormack. Practically all the real power was eliminated?

Mr. Holaday. That is right.

Mr. McCormack. Don't say I did it. [Laughter.]

Mr. Holaday. All right, I am with you.

Mr. McCormack. Now, the House committee didn't recommend the Space Council, did we?

Mr. Holaday. Your memory is better than mine, I don't recall that.

Mr. McCormack. That was put in by the Senate.

Mr. Holaday. I believe that is right.

Mr. McCormack. On the recommendation from the executive branch.

Mr. Holaday. I don't recall.

Mr. McCormack. All right, I can understand how it is that you don't recall.

Mr. Holaday. You remember that better than I, I am sure.

Mr. McCormack. Now the Executive wants the Space Council provision repealed. I will be frank, I never had much enthusiasm for that provision anyway. I realized its impracticability. But with regard to the liaison committee, the House committee attached great importance to that, Mr. Holaday. We wanted to give the committee some real functions; we wanted the committee to coordinate the Government's space activities for the maximum benefit of our country, having in mind both the military and peaceful aspects of space, and recognizing that human difficulties were bound to develop. We wanted an everyday working group that would have authority and would be representative of the two agencies involved for the best interests of our country.

We undertook to establish a liaison committee that would, as far as humanly possible, give both agencies, Defense and NASA, ability to function for the maximum benefit of our country, having in mind not only peaceful pursuit, but our national defense as well.

You realize that, don't you?

Mr. Holaday. Yes, sir.

Mr. McCormack. Now, would you recommend that we continue the liaison committee, and restore the original House language?

Mr. Holaday. Mr. Chairman, it is a little difficult for me to answer.

Mr. McCormack. I realize that. Let me ask you this. The House bill also said—

deemed to relate to military applications of the research and development activities of the Administration including research on and development, con-

struction, testing and operation for research purposes of aircraft, missiles, satellites and other space vehicles, manned and unmanned, together with related equipment, devices, components and parts.

I am reading from the bill as it passed the House. That wasn't in the final legislation that was sent to the President and became law. Does that refresh your memory?

Mr. HOLADAY. Yes. However, before I would attempt to answer your question I would like to study it in detail.

Mr. MCCORMACK. That is fair.

Mr. HOLADAY. But I think I will go this far with you, that in my prepared statement I have very definitely indicated that in my own opinion you can't let these two programs go down their separate and independent roads without somebody being held responsible for at least the exchange of information and the efficient utilization of our resources.

Now, it is very possible that both agencies, NASA and the Department of Defense—and I think this is indicated by the kind of bill that came up here—do not think this formal responsibility is necessary. They think this is going to be taken care of in the day-by-day normal procedures.

Mr. MCCORMACK. In what way day by day? On what level?

Mr. HOLADAY. I guess you had better ask them. They state that this is going to take place.

Mr. MCCORMACK. Ask who?

Mr. HOLADAY. Dr. Glennan and the Department of Defense.

Mr. MCCORMACK. But you are now up here testifying. We would take your views based upon your experience.

Mr. HOLADAY. I am up here testifying and I have had the experience and as I have indicated, I believe that someone must be held responsible to see that there is some coordination and that we are efficiently utilizing our manpower and our equipment.

Mr. MCCORMACK. According to your answers to the questions of the chairman, your Committee did recommend its continuance, in its present form?

Mr. HOLADAY. Our Committee in recommending this, Mr. Chairman——

Mr. MCCORMACK. I am not the chairman. I am just a member.

Mr. HOLADAY. Excuse me, Mr. McCormack. [Laughter.]

I think the members should be asked to appear before the committee to express their separate opinions. The Committee realized that they were not accomplishing an awful lot, but by getting together and discussing the various programs, we identified several problem areas and brought them to the attention of the Administrator and Secretary of Defense. These dealt with the bigger problems of global tracking and communications. This is one of the first items that we brought to the attention of the administration and the Department of Defense. That was some 14 months ago. It is still being discussed and still being worked on. It was a case wherein it appeared that we were going to have two separate tracking facilities in the space program and we recommended that they be brought together into one facility.

Here you have to have cooperation of NASA and the services.

Mr. MCCORMACK. I can understand that. That was one of the purposes of creating the Committee, to be in a position to do that every-

day work: the research and the study, and the searching. You men on that Committee are not low level by any means, we never intended that you would be.

Having in mind the interests of the country, we felt that a Committee of this kind would be very valuable, if it weren't downgraded too much.

Mr. HOLADAY. I might point out to you, Mr. McCormack, that we only had one item ever referred to the Committee by either agency.

Mr. MCCORMACK. Well, I can understand that, Mr. Holaday. I can appreciate how you must feel, serving on a Committee that you want to take pride in, but recognizing that the responsibilities of the Committee are being downgraded, and the opportunity to accomplish some good is taken away.

But would you study the history of this bill as it was adopted by the House, based on your own experiences? When I say you, I mean, of course, in consultation with your associates, and then suggest to this committee amendments to the existing law regarding the liaison committee, assuming our committee were to decide to keep it in the law?

Mr. HOLADAY. That is a request on your part. The only thing I can do it attempt it, yes, sir.

Mr. MCCORMACK. I don't want you to put it that way. In other words, will you assist me by doing that?

Mr. HOLADAY. Yes, I will be glad to.

Mr. MCCORMACK. In other words, what are the ideas of you and your associates, assuming this committee decides to keep the liaison committee as a working functional part of the space effort under the law? What recommendations will you have to make to us in the form of amendments to existing law so as to make your committee a really effective organization, as we intended?

(The information requested is as follows:)

DEPARTMENT OF DEFENSE-NATIONAL AERONAUTICS AND SPACE ADMINISTRATION,
CIVILIAN-MILITARY LIAISON COMMITTEE,
Washington, D.C., March 18, 1960.

Hon. OVERTON BROOKS,
Chairman, Committee on Science and Astronautics,
House of Representatives, Washington, D.C.

DEAR MR. CHAIRMAN: During my testimony before your committee on March 10, 1960, Mr. John W. McCormack requested that I submit to him suggested amendments to the existing Space Act of 1958, believed necessary for the effective operation of the Civilian-Military Liaison Committee (CMLC) if it is decided to retain it.

While the request indicated that the reply should represent the ideas of myself and my associates, I have concluded, after discussion with some of the other members of the CMLC, that an agreed-to position of the members is not practical. The members are subordinate to the heads of the two agencies and the views of the two agencies are being given in testimony presented by representatives of the agencies before the committee. The reply therefore, is my own personal view.

When I appeared before your committee, I stated that I could not say that a CMLC type of statutory organization was necessary. The need for such an organization depends, for the most part, on the intended mission or role assigned to the organization; that is, a liaison activity or a unified policing activity. Liaison may be defined as a bond or link between departments involving coordination of activities and cooperation. Policing in the sense used herein may be defined as the control and regulation of activities involving the efficient utilization of the Nation's space oriented resources. It is my belief that the intended function of the CMLC, if it is to be retained, must be clearly defined before legislative changes to the Space Act of 1958 are considered.

If the CMLC is to be a liaison activity, as the name implies, and limited to the function of being the link or bond for the coordination of activities and cooperation between NASA and DOD, the need for a statutory committee is questionable. This doubt is based on the fact that the strength and efficiency of the link is dependent on the open and voluntary cooperation of the two agencies. The exchange of information will be limited to the amount of information that each agency desires to disseminate either directly or through the statutory channel of a liaison committee. In reality, cooperation cannot be forced to any great extent without either expending the total effort of the link or bond in the searching out of the required information or adding some form of punitive power to the link or bond.

If it is decided to retain a statutory liaison committee for the specific purpose of exchanging information related to the research and development activities of each agency associated with aeronautics and the utilization and exploration of space, my suggested changes are as follows:

1. Section 204 of Space Act of 1958:
   (*a*) Delete paragraphs (b) and (c) of existing section.
   (*b*) Insert paragraphs (b), (c), (d), and (e) of section 205 of H.R. 12575, as passed by the House on June 2, 1958.
   (*c*) Change paragraph (d) of existing section to (f).
2. Add as section 205, under title II of the Space Act of 1958, with subtitle "Programing", paragraph 204(c) of existing act.
3. Change sections 205 and 206 of existing act to sections 206 and 207, respectively.

These suggested changes would establish the formal channel for the exchange of information; however, it must be recognized that such a procedure could create a very serious bottleneck in the flow of information.

In view of the disadvantages of a liaison committee, in that it is of questionable benefit if cooperation does exist and in that a punitive power or regulatory authority would usurp management's responsibility, I consider that the suggestion given in my testimony, that is, either the Administrator of NASA or a suitable person from the DOD should be given the responsibility to see that our resources are efficiently used, is worthy of further consideration. As pointed out above, and in my testimony before the committee, the problems existing in this area require administrative authority to resolve. The person I am recommending would be at this level. He would not have the authority to approve or disapprove the other agencies' projects. He would be responsible only for identifying and presenting to management those activities in either agency which were identified as being unjustified from the standpoint of efficient utilization of our resources.

I trust the above information has been responsive to your request.

Sincerely yours,

W. M. HOLADAY, *Chairman.*

Mr. RIEHLMAN. Mr. Chairman, would the gentleman yield for just an observation?

Mr. MCCORMACK. Be glad to.

Mr. RIEHLMAN. Mr. Holaday, in response to a question you said that you would recommend a watchdog committee. I would like to have you express at this time what you had in mind. How would a watchdog committee really operate? I thought that the committee that we now have was a watchdog committee, and was supposed to report what was going on; such things as duplication and overlapping of activities by the Department of Defense and NASA.

Now, if the CLMC is not effective and active, what can you suggest in the way of a watchdog committee that can be effective?

Mr. HOLADAY. Maybe I should attempt to answer your question first.

I did not necessarily specify a committee. I specified an individual instead of a committee. It has been the feeling of both NASA and DOD that CMLC could not be effective because it had no authority and if it was going to attempt to settle differences between the two

agencies, it would be taking over part of the responsibility of management.

Therefore, management said: We don't need a committee in this place because they can't take over our management responsibilities. We as managers will settle this thing and we don't need the aid and assistance of the committee.

I have suggested one individual, not a committee, administrative level, in which this responsibility should be placed. The Administration is not satisfied with the committee and doesn't want it making decisions and I think management has some right to question this.

Therefore, I say take one of the people that is in the management route and give him the responsibility.

Mr. RIEHLMAN. And under this manager would you have this watchdog committee that you are speaking about?

Mr. HOLADAY. I don't care how he does it. I just say somebody has to be held responsible.

Mr. RIEHLMAN. In response to some questions from my distinguished friend, the majority leader, you have stated that you feel this responsibility must either rest in the Administrator of NASA, or the head of the Department of Defense.

Am I correct in that?

Mr. HOLADAY. Yes, sir.

Mr. RIEHLMAN. And all equipment?

Mr. HOLADAY. I am talking about space and aeronautics.

Mr. FULTON. Will the gentleman yield, Mr. McCormack?

Mr. RIEHLMAN. I am sorry. Thanks, Mr. McCormack.

Mr. FULTON. Will you yield?

Mr. MCCORMACK. Yes. We are operating under the five-minute rules, I have long since gone over it.

The CHAIRMAN. We haven't operated this morning under the five-minute rule. I'll just recognize Mr. Fulton.

Mr. MCCORMACK. Yes, I yield to Mr. Fulton. I just have one or two more questions to ask.

Mr. FULTON. I yield to Mr. McCormack. Go ahead.

Mr. MCCORMACK. In other words, as a result of the questions of the chairman, you believe that the research in connection with outer space should be in NASA—in one agency?

Mr. HOLADAY. In one agency.

Mr. MCCORMACK. And you further said in response to my question that the agency should be NASA?

Mr. HOLADAY. Yes.

Mr. MCCORMACK. In response to my questions and Mr. Riehlman's questions, your view is that the Secretary of Defense and Administrator of NASA should get together and decide who has jurisdiction, if any question should arise?

Mr. HOLADAY. That is right.

Mr. MCCORMACK. You realize, of course, there would be many complicated questions? If authority is completely in NASA, NASA might take the position that our emphasis is on peaceful purposes, and if the Defense Department wanted some research done of a military nature, NASA might claim they haven't got the funds, or the time, or the personnel. NASA would have a veto over military recommendations for research activities in the development of military instruments and appliances. You realize that, don't you?

Mr. HOLADAY. Yes, sir.

Mr. MCCORMACK. That leaves a void, doesn't it? Suppose the Secretary of Defense and the Administrator of NASA can't get together. Do you recommend that they go to the President as Commander in Chief and as the President?

Mr. HOLADAY. That is right.

Mr. MCCORMACK. But he is already overworked, isn't he?

Mr. HOLADAY. Yes, sir.

Mr. MCCORMACK. That means he is going to delegate it, in all probability. I am just exploring, evaluating, imaging myself as President, with all of the manifold duties the President has.

You wouldn't even have it cleared through the Joint Chiefs of Staff as to whether or not from a military angle there should be a recommendation, would you?

Mr. HOLADAY. Sir, I wonder if this would be of any aid and assistance here? This always gets down to a question of money. Those particular projects that Defense is very much interested in in this research area, why not have the Defense Department measure their importance against their other research programs and put their money into supporting these projects.

In other words, NASA would not necessarily have to come up on the Hill and get all their money separately. If the military wanted to support it, they could put their money in, they could put their men in, they could help do it, and you would be carrying on one program rather than two programs.

Mr. MCCORMACK. We can picture that, but having difficulties is part of the human operation.

The question is who has the decision-making power, particularly where the military is involved. After all, the military is concerned with the preservation of our country, not only ourselves, but the next generation. I am thinking of these kids coming along.

The CHAIRMAN. It seems to me what you have in mind, as far as the military interest is concerned, is a situation like that which existed under NACA, prior to the creation of NASA, isn't that right?

Mr. HOLADAY. NACA was very definitely in the research and development area. They were not directly involved in the making of any final hardware, but their efforts were carried out to assist the military and also civilian aviation, indirectly or directly.

The CHAIRMAN. And the military would make requisitions on them.

Mr. HOLADAY. That is correct.

The CHAIRMAN. To do certain things and then NACA would do what was requested and turn the results over to the military. Is that your idea?

Mr. HOLADAY. That is correct.

Mr. MCCORMACK. Then your answer seems to be just the opposite of what you have said heretofore? You would have the military make requests of NASA. It is a question of who will make decisions.

Mr. ANFUSO. Would the gentleman yield on that point?

Mr. MCCORMACK. Yes. I am just trying to explore. This is the heart of it as I see it.

Mr. ANFUSO. I agree with you.

The CHAIRMAN. This is the heart of the whole thing.

Mr. ANFUSO. Mr. Holaday, we all realize there are going to be military functions and peaceful functions. The military is going to claim that certain functions belong to it. NASA is going to claim certain functions belong to it. The problem that is causing concern in the distinguished majority leader's mind has been working in my mind.

If we had a President who could tackle that job, perhaps it would be his job. On the other hand the President might wish to appoint a coordinator of space activities. We could amend the act to permit the President to create such a new post. Do you see what I am driving at?

Your words were, "someone must be held responsible."

You feel that under the present setup no one will be held responsible because there is division of authority; isn't that correct?

(Mr. Holaday nods.)

Mr. ANFUSO. Now, would you create a new office, perhaps to be called the Office of the Coordinator of Space Activities? A man just under the President, appointed by the President, who will coordinate the activities on space, and authorized to determine what functions belong to the Defense Department, and what functions belong to NASA? Do you follow me?

Mr. HOLADAY. Yes, I follow you.

I don't know if any one person has the capability to do all of these things. As Mr. McCormack has pointed out, it is the decision making route that brings us to our trouble. I am not saying that the suggestion that has been made by the administration of having two programs, and that they go down their separate ways, is not the way to do it. Considering the existing organizations, that is the present setup, this approach might be the best. When I am talking about this person to be held responsible, I am not talking about this person making the decisions that this project is going to be done in DOD and another is going to be done in NASA. I am stating that this person should be responsible for insuring the efficient utilization of our resources by identifying possible problem areas and obtaining solutions with the management of the other agency.

If there is a difference, then the difference of opinion can be settled by the President.

Mr. ANFUSO. The only person that could do that would be the President or some high-ranking person appointed by him; isn't that right? We anticipate differences between NASA and DOD, but should not the President appoint some high-ranking person such as a coordinator to make the required decisions?

Mr. HOLADAY. What bothers me about your suggestion in this question of coordinator——

Mr. ANFUSO. I don't care what you call it.

Mr. HOLADAY. You would have to be very careful what you call it, otherwise, you will put him in the position of making all decisions and the two agencies wouldn't attempt to try and work it out between themselves. He, in effect, would become a czar if you are not very careful in how you write that type of legislation.

I think that it is possible for the President to appoint someone from either agency to be responsible for seeing that we are exchanging information.

Actually, even over the past year, with the adjusting and moving of some programs around, we have had very excellent cooperation and discussions between Defense and NASA in getting the work located in one agency or the other to carry forward.

Now——

Mr. ANFUSO. Mr. Holaday, I can foresee difficulties between NASA and DOD. When those difficulties arise, who will resolve them? They are going to run to the President, aren't they?

Mr. HOLADAY. Yes, sir.

Mr. ANFUSO. All right. Since we know the President won't be able to tackle these problems, shouldn't we adopt some provision for creating some office that would handle these problems?

Mr. HOLADAY. Well, these difficulties, if they arise, could become very important and the only person they may feel who could settle it would be the President?

The CHAIRMAN. Mr. Fulton?

Mr. FULTON. I believe my time has expired, but if I could have 2 more minutes——

The CHAIRMAN. Go right ahead, Mr. Fulton.

Mr. FULTON. I agree with the majority leader, Mr. McCormack, on his approach to this problem of the Civilian-Military Liaison Committee. I agreed with him previously when he was the chairman of the select committee that handled the start of the legislation on space.

As a matter of fact, I might say to Mr. Holaday that when he was referring to Mr. McCormack, speaking of the committee bill in the 85th Congress, he was correct in calling Mr. McCormack the chairman because Mr. McCormack was then chairman of the select committee.

Mr. MCCORMACK. That was only a little humor.

[Laughter.]

Mr. FULTON. That was his title at the time.

There must be some sort of a liaison, that is, a path back and forth between NASA and DOD. The question is how you get the path and how you implement it? Originally, when we reported out the Committee bill we thought that we had a pretty good solution to that problem. I am sure that both sides of the committee felt that there would have to be a day-to-day liaison, that problems couldn't be settled otherwise.

We felt that it was too important, both from the standpoint of the military security of the country, the scientific approach in the exploration of space.

At that particular time, as I recall, we were questioning ARPA regarding its liaison with NACA, and with various other agencies, to see that they were not getting bogged down.

I believe this type of liaison has to be done on a day-to-day basis and therefore I would favor, though not finally, the version of the select committee as it passed the House.

I believe Mr. McCormack, we spend a lot of time on that. Mr. Sisk recalls that, too. We discussed these matters at length.

I don't believe I would agree with the Administration that the Civilian-Military Liaison Committee should be abolished.

There has been only one particular situation given to it by either NASA or DOD. I don't think that is a reason for stopping it. I think it is a reason for stopping and looking and maybe going back to what the original select committee had, to give it a real try.

I am afraid that if we put an individual in, that he will gradually get to be the person who is doing administrating, making decisions in both these fields, rather than being the liaison between the two fields and sort of a balancer.

I think it might move him into the decisionmaking category. We already have the scientific adviser of the President, to whom many of these things are referred for advice and counsel. We have also had a council, as you know.

My question is this: Can you suggest some way that would give you, and your committee, enough authority to be effective on this day-to-day military-civilian liaison work?

How do we implement that channel so there is some real authority for you? I think you are the one who has had the experience, and I would agree with the chairman that you are the one who should comment on the select committee provisions as to whether they will suffice or whether we should, if we use the committee form, give authority in some way to the committee which is limited to an advisory or a functional authority, rather than an administering authority? If you have any ideas on how to do it, assuming the committee form is to be retained, I would like to have them and I join with the chairman in requesting it.

That is all, Mr. Chairman.

The CHAIRMAN. Thank you, Mr. Fulton.

Mr. Miller?

Mr. MILLER. I have no questions.

The CHAIRMAN. Mr. Van Pelt?

Mr. VAN PELT. Mr. Holaday, this Civilian-Military Liaison Committee, is that operating now?

Mr. HOLADAY. You mean as of today?

Mr. VAN PELT. Yes.

Mr. HOLADAY. Well, as far as my time is concerned and also Mr. Underwood, who is the committee's secretary, we are still devoting a fair amount of our time to what few things come our way. I would say "What few things," very definitely. Since the change in legislation came to the Hill, anything of this type has dropped off to practically nothing.

We have been cleaning up our files. If anything does come to our attention, we have been moving it along, but one could almost say that there is practically nothing coming to us now.

Mr. VAN PELT. Well, I have been sitting here listening quite attentively to these questions, and if I weren't confused before I came in, I certainly am now. The other day Dr. Glennan indicated any number of times that there is liaison between DOD and NASA.

Mr. HOLADAY. Yes.

Mr. VAN PELT. On a day-to-day basis.

Mr. HOLADAY. Yes, sir.

Mr. VAN PELT. And on one occasion, when we were down at Huntsville, General Medaris said there were too many chiefs. He said

they couldn't determine the program and follow it through, in some instances, for more than 6 months before there were changes.

That is the reason I ask this question: Why should we have an Administrator of NASA; why not put a committee over it?

Mr. HOLADAY. Are you asking me as a question whether you should put a committee to run NASA instead of an Administrator?

Mr. VAN PELT. Yes.

Mr. HOLADAY. No; I would not go along with you on that suggestion at all. If you don't want to get anything done, appoint a committee. (Laughter.)

Mr. VAN PELT. I certainly agree with you, but here you have a man with responsibility to the President, who confers with the President at least once every 2 weeks and sometimes oftener, according to his testimony, and with the Defense Department.

That is all, Mr. Chairman.

The CHAIRMAN. Mr. Anfuso?

Mr. ANFUSO. I just have one question, Mr. Chairman, thank you.

Mr. Holaday, to get back to my previous suggestion, it is proposed that we eliminate the Advisory Council. Would you create the Office of Presidential Adviser on Space Research?

In other words, these two agencies, DOD and NASA, whenever they have any squabbles, would go to this man who would be appointed by the President to handle this type of problem, and who would see that both agencies work together, and who would resolve all differences. You disapprove of committees and I agree with you.

But would you create the title of a Presidential Adviser on Space Research?

Mr. HOLADAY. No; I don't believe that I could go along with you on that. I think the present scientific adviser, which he has, would be capable of making a thorough technical study of the problem and report to the President.

Mr. ANFUSO. But he doesn't have the power now to settle differences between NASA and DOD, does he?

Mr. HOLADAY. My difficulty here in going along with you appointing a person of this type with power gets him into the czar category, and, in effect, you are putting someone with authority or decision capability above members of the Cabinet. If I were a Cabinet member and I had an argument with some other Cabinet member and we couldn't come to an agreement, I would think that the President would be the only person to settle the dispute.

Mr. ANFUSO. One final question: Would you approve of a congressional watchdog committee?

Mr. HOLADAY. Approve of what?

Mr. ANFUSO. A congressional watchdog committee?

Mr. FULLER. We are that now.

Mr. HOLADAY. Well, you certainly are. And during the coming years that this program is being formulated and getting underway the congressional committees, in behalf of the public, have to follow the progress.

Mr. ANFUSO. Thank you very much.

The CHAIRMAN. Mr. Riehlman?

Mr. RIEHLMAN. No other questions at this time. Maybe I will have one at the close.

The CHAIRMAN. No other questions? Mr. Sisk?

Mr. SISK. Mr. Holaday, I have been somewhat impressed with your statement. In attempting to analyze what you have said in answer to questions, as well as in your statement, I am inclined to believe that you feel that there is a need for a type of committee such as the one you now head, but that probably the type of committee to which Mr. McCormack referred, that is the type which the House wrote into the bill in the beginning, a committee with stature and some authority, would be more successful.

Now, is that generally true or not? Do you disagree with that statement?

Mr. Holaday, it seems to me that you feel that there is a need for this liaison committee, or something to take its place if it is done away with, but that it must be a committee or a group with stature and authority, and with specific tasks and some opportunity to make some decisions; is that true?

Mr. HOLADAY. No, no; don't be misinterpreting me. In the recommendation given in my statement, I am saying that since the present administration has not used the CMLC and has stated that all decisions which it would make were a responsibility of management, I have therefore said that a management person should be this watchdog, to point up the differences and get them resolved.

Now putting in any committee—and even when I consider the one proposed by Mr. McCormack, I can't visualize that you can put in such a committee without causing operating difficulties.

If the committee is one that would be appointed by Defense and NASA, so to say, a group of people who are going to keep a watch on these mutual areas and if they see the differences occurring, problems occurring, bring them to management's attention, this is fine.

But I am not supporting putting in any strong committee at the present time. I have had experience with the CMLC and it has been very discouraging. I don't believe that under the present setup that a committee with a lot of power is workable without taking over part of the responsibilities of the Secretary of Defense and the Administrator, which is undesirable.

Mr. SISK. All right. On page 3 of your statement, Mr. Holaday, near the top of the page you recite the background of the committee, its 13 meetings and so on, and you say:

> For the most part the items of business brought before the committee at the formal meetings are of the information type to keep the committee of the whole informed of the activities of NASA and DOD in the fields of aeronautical and space research and development.

Then you go on from there. Now, the select committee intended that the committee would be a group of people who would keep the two agencies fully and completely informed to avoid duplication, and to make such recommendation as they felt necessary to avoid misuse or waste of money, and so on. And, of course, this transfer of information was the most important part of the committee's duties.

Who is going to perform this duty? You don't mean to tell me that the Administrator of NASA and the Secretary of Defense, at their level, when they meet from time to time, are going to have the opportunity of exchanging——

The CHAIRMAN. Gentlemen, gentlemen, we will have to come to order. There are several conversations going on here and if we are going to hear the witness, we ought to listen to him.

Mr. HOLADAY. Let me answer you. First, I don't believe you should ask me that question. The Department of Defense, the Administrator of NASA and the President have said, as they have recommended in their legislation, that this kind of cooperation and coordination will take place. It is covered in section 309 of H.R. 9675. That is their recommendation. I can't answer for them.

Mr. SISK. I appreciate your statement. We have had them before us and very frankly, I am not satisfied with their answers to this question, Mr. Holaday.

There must be this exchange of information; you agree with that, do you not?

Mr. HOLADAY. Very definitely. I agree that there must be exchange of information, particularly in the small research projects that are going on in the various places to insure these people are getting together and exchanging their information so that we don't have two groups trying to get the same answer. Now, this is hard to do in a large research program, particularly one as large as the space program. This contact can be at working levels, but there must be a desire or hope to work together as a unit and not go down separate roads. We have had pretty good desire to obtain cooperation during the last year. As I pointed out these agencies have been getting together and exchanging information in an attempt to coordinate their programs.

If cooperation continues along these lines the result should be successful. I think the thing that you are worried about and the thing Mr. McCormack is worried about is: Will they always go down the road as nice friendly people all working toward the same objective?

Mr. SISK. Specifically, Mr. Holaday, do you know of any specific breakdown in the channels of information between NASA and DOD that have led to duplication or a waste of money?

Mr. HOLADAY. No; I can't point any out, as I previously indicated. They have actually been working very diligently and very hard in getting together to eliminate duplication. Where problems did come up they were discussed and a solution found. There was some planned duplication. This is perfectly OK, and, as a whole, they have been doing good work together.

Mr. SISK. I am not referring to planned duplication. You mentioned on page 3.

The formal actions of the committee are few in number and consist of recommended actions to the Secretary of Defense and the Administrator involving (1) the priority for the manned satellite, Mercury, and the 1½-million-pound thrust rocket engine.

This is a little aside from the general subject we are exploring, but what was the recommendation of your committee on the F–1 engine with reference to priority?

Mr. HOLADAY. We did not recommend that it become a top national priority. You must understand that the No. 1 priority is primarily a materials priority and as such it goes only to selected projects as you start moving into the large production area. This project is still in the research area and there is no material problem.

Mr. SISK. All right. The last question that I have, Mr. Holaday, has to do with your statement at the top of page 4 and I think it has already been discussed to some extent but I would like a little further comment on it. At the bottom of page 3 you start out:

As I mentioned earlier the committee is only one of the channels—

and so on, and then you wind up by saying—

This status—

you are referring here to the fact that the role of the committee has been of relatively minor importance—

This status of the committee, I might add, has caused some concern on the part of the members.

Of course, that goes back to the first question I asked you. It seems to me that you are saying that the fact that this committee has been relegated to one of minor importance is of some concern to the members of the committee. Well, that doesn't exactly jibe with what I understood your answer to be to my first question.

In other words, does the concern of the members of the committee go to the question that there exists such a committee, or does it go to the point of the relative unimportance of the committee, as you indicated in your statement? What is the concern of the members, basically?

Mr. HOLADAY. I think the concern here gets into this category of confusion, where people have from time to time thought that the committee had a lot of power but the members of the committee from the very start realized that they did not have any power. As members, themselves, they were in hopes that they could take a more active part in the program than has been allotted to them. But in the fact that they concluded that they should continue, I think, is an indication that they personally, themselves, believe that the committee was doing its job as they visualized it; that is, watching the programs.

The CHAIRMAN. Will the gentleman yield at that point?

Mr. SISK. Yes.

The CHAIRMAN. I would like to ask you this: In your charter you are authorized to assist in transfer of projects and facilities between two agencies pursuant to a transfer of primary responsibility. Now, we have just had an important transfer from the Army to NASA. What is your committee doing to assist?

Mr. HOLADAY. Nothing.

The CHAIRMAN. Why aren't you?

Mr. HOLADAY. We weren't asked.

The CHAIRMAN. Do you have to be asked when you have authority under your charter? Don't you move in and assert your authority?

Mr. HOLADAY. I think the word "authority" is rather poorly used in this particular case. We were not asked to take any part in it. In fact, I had a very definite feeling that we were discouraged of taking any part in it. This was a case where management felt like that any work along this line was management's responsibility and therefore they were capable of handling the problem without any assistance from the committee. We took no part whatsoever in the transfer of ABMA.

The CHAIRMAN. As I read your charter you have tremendous power in the Committee. It seems you are correct when you say that you didn't use it.

Mr. HOLADAY. I don't think that I interpret that we have power.

The CHAIRMAN. Well, I won't take the time now, but later on I would like to ask you more on this.

Mr. SISK. Would you continue to answer the question I had asked. Maybe you had gone as far as you could, Mr. Holaday. These questions are not intended to be critical. I am rather happy about your statement in general, because I think it brings up some rather pertinent points, and very frankly it makes me all the more opposed now to the elimination of your committee unless something is put in its place. What is wrong with a space czar? You seem to think there may be something wrong with a space czar. I don't know, maybe we need a space czar.

Mr. HOLADAY. I don't know. That used to be a very popular term around here 2 or 3 years ago. I don't know that we gained much by all the chatter.

I can't tell you what is wrong with a space czar, but I am afraid with the kind of programs we have, two programs, a space czar would be pretty busy at the present time.

The CHAIRMAN. I think so, too. That is the whole point. I think he should be busy. You indicated you agree with Bruce Medaris and Dr. Pickering to a certain extent, and I do, too. I was happy to hear you say that. In essence, aren't they saying that in the final analysis we should have one person who has the authority to make decisions, and one channel to handle this whole program of space exploration and development and research?

Of course, such a man must be responsible to the President under our form of government. The President himself doesn't have the time to do these things, to acquire the knowledge, and spend the time and effort, and to determine all the details. But don't we need one person who will have overall authority and who will report to the President?

Mr. HOLADAY. Well, I don't know who that fellow would ever be to step into that job.

Mr. SISK. I realize, Mr. Holaday, it is a big job.

Mr. HOLADAY. Under the present circumstances, I feel sorry for him. [Laughter.]

Mr. FULTON. Would you yield for one question?

Mr. SISK. I would be glad to yield.

Mr. FULTON. Did you ever send a memorandum to either the DOD or the NASA agency and say: "Look, this legislation says that the channel of communications shall, which is 'must,' be through this Civilian-Military Liaison Committee." Did you ever do that?

Mr. HOLADAY. I will answer your question in this form: When I was asked to take the chairmanship of this Committee, which I very reluctantly took, the charter had already been written and it had already been determined by the administration that the Committee was to be only a channel, or one channel, and that the Committee was not going to be a bottleneck to stop the exchange of information back and forth. So this had been decided beforehand. Even in the revision of the charter of the Committee we used what was in the law,

but when you get down to what is finally in the law, not what the House version said, it is not clearly defined there that this is the only channel.

Mr. FULTON. Yes. But the law says "shall," which means must. The law requires a channel to be kept open with representatives of the Department of Defense, Army, Navy, and Air Force on the military side, together with NASA representatives, all sitting under your chairmanship.

You were appointed by the President, and you have the cloak of Presidential authority when you act as Chairman of this Committee. Now, then, you have a very fine reputation for getting along with people. But I think possibly in this instance they thought that if they just bypassed you completely, your well-known reputation for getting along with people would save any trouble. So my question is: Did you ever object when liaison, not only in major portion of it, but almost exclusively, started to go around this channel that Congress set up? You see, we tried to make it clear that NASA and DOD must have day-to-day liaison with representatives of the military and the civilian agency sitting together with a presidentially appointed Chairman presiding. I would agree with Mr. McCormack that we had a pretty good method worked out originally, and a fairly good method worked out in the final provisions of the act. I am sorry this has occurred.

The CHAIRMAN. Would the gentleman yield?

Mr. SISK. Yes.

The CHAIRMAN. I would like to ask this: Section 2 of your charter authorizes you to investigate and to find and recommend courses of action where jurisdictional differences between the two agencies have arisen or might arise; tell me this, did you assert the authority that you have under that section? If so, in what cases did you recommend that there might be some method of working out jurisdictional differences?

Mr. HOLADAY. Sir, the best example we have of that, I believe, is where we worked on a number of items in which we made recommendations. One of these as I said earlier, has to do with the global tracking and data handling. A recommendation was made to both the Secretary and the Administrator some 14 months ago. This has not been resolved yet.

The CHAIRMAN. Now, did you make a recommendation as a committee on that?

Mr. HOLADAY. We made a recommendation that this problem was getting, in effect, out of hand, and that it should be developed into one program rather than two programs which were developing as of that particular time.

The CHAIRMAN. Could you put a copy of your recommendations in this record?

Mr. HOLADAY. We have the correspondence on this. Yes, we have the correspondence.

The CHAIRMAN. You don't have to do it now. It takes a little time. But if you will put it in the record later, I would appreciate it. I would like to know what you recommended, and what action was on your recommendations.

Mr. HOLADAY. The action, sir, I will report at this time; it is under study, but it has not been resolved.

The CHAIRMAN. All right. Under section 5 of your charter, you are authorized to suggest areas for joint investigations by the two agencies; areas where assistance of one agency by the other might prove beneficial. Now, it seems to me that gives you considerable authority. What have you done under section 5?

Mr. HOLADAY. The latest one on that is in connection with the geodetic—this is an unclassified meeting, is it not—this had to do with a geodetic satellite approach and also another one which I would prefer not to mention in an open meeting. These were two approaches being taken by the Defense Department and by NASA. We have written to both of them stating that in our opinion it would be better if these became single projects. In other words, in the geodetic satellite work instead of the military going down its road and NASA going down its road, attempt to pull this together into one project.

The CHAIRMAN. Well, that is the type of work that I think this committee and the Congress wanted you to do.

Mr. HOLADAY. We have been able to do a little, Mr. Chairman. I will have to concur with you, although we were not able to do an awful lot along these lines.

The CHAIRMAN. Now, you are authorized under section 7 of your charter to coordinate requirements for launch and other developmental test facilities. That isn't all of it, but that is substantially it. What did you do on that? Did you do anything at all in coordinating?

Mr. HOLADAY. We brought to their attention the need of getting the global tracking pulled together. This was solved by the NASA and DOD appointing a committee to function in this particular area and they said that they could jointly, at a working level work this out. I believe this is one of the items that, after some 14 or 15 months, is still being worked out.

The CHAIRMAN. You feel that they have dragged their feet, then?

Mr. HOLADAY. No, not necessarily. I wouldn't want to imply that.

The CHAIRMAN. I would like to see a copy of your report because under subsection (d) of section 8 of your charter you are authorized to report jointly to the Secretary of Defense and the Administrator of NASA your findings, conclusions, and recommendations. Now, do you have a copy of that report that the committee could study?

Mr. HOLADAY. Which report, specifically?

The CHAIRMAN. Authorized by section (d) of subsection 8 of your charter.

Mr. HOLADAY. Are you specifically making reference to the report which I did on boosters?

The CHAIRMAN. No. The report which is authorized by section (d), to be made jointly to the Secretary of Defense and the Administrator of NASA of the findings, conclusions, and recommendations of the committee, including successfully negotiated solutions, and unresolved differences of the two agencies. Now what have you recommended there?

Mr. HOLADAY. Well, Mr. Chairman, I think that would be covered to a large extent in the correspondence and recommendations that have gone to NASA and DOD. We can leave copies of this type of correspondence and related information with the committee.

The CHAIRMAN. At this point I would like the record to show the functions and authority of the Civilian-Military Liaison Committee,

because I haven't covered all of the charter by a long shot, and I don't want to impose on the good nature of our good friend, Mr. Sisk.

Mr. SISK. That is all right.

The CHAIRMAN. I would like the record to show all of the functions and authority as given by the charter of this Civilian-Military Liaison Committee adopted July 1, 1959.

Mr. HECHLER. Would the gentleman yield if the chairman is finished?

The CHAIRMAN. Yes. Mr. Sisk has the floor.

Mr. SISK. I will yield.

Mr. HECHLER. I would like to ask that there also be added the original terms of reference approved by the President October 29, 1958, so we can see the way in which the June 30, 1959, revised terms strengthened the role of CMLC. Thank you.

The CHAIRMAN. I have no objection to that.

(The information requested is as follows:)

CIVILIAN-MILITARY LIAISON COMMITTEE,
Washington, D.C., March 23, 1960.

Hon. OVERTON BROOKS,
Chairman, Committee on Science and Astronautics, House of Representatives, Washington, D.C.

DEAR MR. CHAIRMAN: In response to a committee request during the hearings of March 10, 1960, I am forwarding to you the following information for insertion into the record.

The original terms of reference prepared jointly by the NASA and DOD and approved by the President on October 29, 1958, are as follows. (See app. I.)

In May of 1959, the chairman of the Civilian-Military Liaison Committee proposed to the Administrator of NASA and to the Secretary of Defense that the terms of reference be revised to reflect a more responsible assignment for the Civilian-Military Liaison Committee. This proposal was as follows. (See app. II.)

The above proposal modified to conform to the policies of the National Aeronautics and Space Administration and the Department of Defense was used to formulate a revised terms of reference for the Civilian-Military Liaison Committee. These revised terms of reference, approved by the President on June 30, 1959, are as follows. (See app. III.)

As indicated in section 5(d) of the original terms of reference and in section 3(d) of the revised charter, the Committee was to report its conclusions, findings, and recommendations to the Secretary of Defense and the Administrator. To conform to the terms of reference, the Committee at its first meeting, on November 25, 1958, agreed that the approved minutes of each meeting would constitute its normal report to the Secretary of Defense and the Administrator. In addition, it was agreed that a special report, in the form of a letter, would be issued as needed to expedite the Committee's action on a specific agenda item. These two procedures are the Committee's reports referred to during the preceding testimony.

Specifically in reviewing the Committee's action regarding the global tracking and data handling, it has been established that the Committee did not make any formal recommendations and report them to the Secretary of Defense and the Administrator. The problem of global tracking and range instrumentation was brought to the attention of the Committee members by the chairman in the following memorandum in early December. (See app. IV.) The Committee, at that time, decided to include the proposal on the agenda for the January meeting. During December as a result of several informal meetings between representatives of DOD and NASA and the chairman of CMLC, a joint NASA-ARPA Committee on U.S. satellite and space vehicle tracking and surveillance requirements was established by the two agencies to study the problem. On January 8, 1959, the study was presented to the Administrator, the Deputy Secretary of Defense, the Director of ARPA, and the Chairman, CMLC. The result of this study and presentation was the consummation of a formal agree-

ment between the Administrator and the Secretary of Defense on the NASA-DOD relationships in the fields of global tracking, data acquisition, communications and data centers for space flight. The agreement is as follows. (See app. V.) Since this action on the part of NASA and DOD negated the need for further consideration by CMLC, this item was dropped from the agenda of the January meeting.

As provided for in the agreement, a permanent technical committee with joint representation was established at a later date to study and monitor, on a continuing basis, the national requirements for satellite and space vehicle ground instrumentation for the purpose of insuring an effective and economical national program.

A CMLC report to the Secretary of Defense and the Administrator containing the committee's recommendations regarding the global tracking and communications problem does not exist. A special letter report pertaining to the assignment of an appropriate priority to the manned satellite program. Project Mercury, and the 1½ million pound thrust rocket engine has been substituted as a means of indicating the procedure used by the committee to report to the Secretary of Defense and the Administrator. The letter is as follows: (See appendix VI). The approved minutes of the meeting, which constitutes the normal report to the Secretary of Defense and the Administrator, are classified at the present time and cannot be inserted into the record.

I hope that the above information satisfactorily fulfills the request of the committee.

Sincerely yours,

W. M. HOLADAY, *Chairman.*

APPENDIX I

CIVILIAN-MILITARY LIAISON COMMITTEE TO THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AND THE DEPARTMENT OF DEFENSE

Approved October 29, 1958

TERMS OF REFERENCE

Organization

1. A Civilian-Military Liaison Committee is hereby established, pursuant to section 204 of Public Law 85–568, known as the National Aeronautics and Space Act of 1958, hereinafter called the act.

Objective

2. The role of the Civilian-Military Liaison Committee, hereinafter called the Committee, is set forth in section 204(b) of the act as follows:

"The Administration and the Department of Defense, through the Liaison Committee, shall advise and consult with each other on all matters within their respective jurisdictions relating to aeronautical and space activities and shall keep each other fully and currently informed with respect to such activities."

Functions

3. The committee will—

(*a*) Provide a channel for official advice, consultation, and exchange of information and maintain a flow of this information adequate to keep the Administration and the Department of Defense, including the military departments in their respective areas of interest, fully and currently informed of each other's aeronautical and space plans, programs and activities.

(*b*) Encourage and facilitate contacts between the Administration and Department of Defense at appropriate levels and in all areas which will provide for the most effective use of relevant national assets in skills and facilities.

(*c*) When requested by the Administrator, National Aeronautics and Space Administration, or the Secretary of Defense, study and recommend courses of action where jurisdictional differences between the Administration and the Department of Defense have arisen, or might arise, unnecessary duplication of effort might develop, or coordination of jointly sponsored or related programs is required.

(*d*) Perform such other functions as may be assigned from time to time by the Administrator, or the Secretary of Defense.

Membership

4. The Committee shall consist of—

(*a*) A Chairman who is the head thereof and who is appointed by the President.

(*b*) Four representatives to be assigned by the Secretary of Defense, one of these representatives will be from the Department of Defense and one representative from each of the Departments of the Army, Navy, and Air Force.

(*c*) Four representatives to be assigned by the Administrator.

(*d*) The Administrator and the Secretary of Defense may appoint alternates to serve on the Committee in the unavoidable absence of the designated representatives.

Procedure

5. Rules of procedure for the Committee—

(*a*) The Committee shall meet at least once monthly at the call of its Chairman, and at such other times as the Committee may fix.

(*b*) Conclusions, findings, and recommendations of the Committee (including dissents and nonparticipation, if any) shall be reported to the Administrator and the Secretary of Defense.

(*c*) The Chairman shall convene and preside over meetings of the Committee, direct the secretariat, and serve as a representative of the Committee, as required.

(*d*) The Chairman may, in case of temporary incapacity, designate one of the representatives to preside or act otherwise on his behalf.

Administration

6. The Chairman is authorized to—

(*a*) Establish a small secretariat consisting of one Assistant to the Chairman, who shall also serve as secretary to the Committee; and adequate stenographic-clerical staff.

(*b*) Draw upon the members of the Committee for ad hoc secretariat assistance for specific tasks. During such ad hoc assignments, personnel so assigned shall be acceptable to and solely responsible to the Chairman.

(*c*) Obtain administrative support for the Committee and the secretariat from the Administration and the Department of Defense as needed, including office space; facilities; budgetary, legal, and clerical help.

APPENDIX II

DEPARTMENT OF DEFENSE
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION,
CIVILIAN-MILITARY LIAISON COMMITTEE,
Washington, D.C.

Memorandum for the Secretary of Defense, the Administrator, National Aeronautics and Space Administration.

Subject: Terms of reference for Civilian-Military Liaison Committee.

Attached are my suggestions for changing the Terms of Reference for the Civilian-Military Liaison Committee. You will note that I recommend a more responsible assignment for the Committee. The suggested terms of reference are believed to be more responsive to the law and to points included in the conference report. The responsibilities assigned are directed toward the problems of the exchange of information and coordination that fall between the two agencies and do not preempt the management prerogatives of either the Administrator or the Secretary of Defense.

It is very clear to me that the intent of the law was to provide a mechanism through the use of the CMLC to resolve, if possible, differences which might arise between the two agencies. I have quoted below, for your convenience, excerpts from the Conference Report which appear to support this approach.

Page 16—"However, because there is a gray area between civilian and military interests, and unavoidable overlapping, it is necessary that machinery be provided at the highest level of Government to make determinations of responsibility and jurisdiction.

"This act makes such provision by providing that the President, assisted by an Advisory Council, shall make the actual determinations in the assignment

of new programs or projects. The act also provides that the Administrator of the National Aeronautics and Space Administration and the Secretary of Defense can seek solutions to questions of jurisdiction either directly or through a Civilian-Military Liaison Committee to hold to a minimum the questions referred to the President and the Council."

In the terms of reference which I offer, I suggest that the Committee strive to seek solutions to problem areas. If unanimous agreement is reached, the solution is referred to the Administrator and the Secretary of Defense for concurrence. If they do not agree with the solution, they can attempt to resolve the problem or refer it to the Space Council. If the Committee does not obtain unanimous agreement, the problem will be referred to the Administrator and the Secretary of Defense, either to resolve or refer to the Space Council.

Page 20—"The Administration and the Department of Defense, acting through the Liaison Committee, will advise and consult with each other on all matters within their jurisdictions having to do with aeronautical and space activities, keep each other fully and currently informed on these activities, and strive to reach agreement on differences which might arise in this area between the two agencies.

"In the event of failure by the liaison committee and their superiors, the Secretary of Defense and the Administrator, to reach an agreement over a difference arising between the two agencies in the field of aeronautics and space activities, then either official can refer the matter to the President for his decision, which would be final."

There are many committees, panels, and working groups being formulated as a means of exchanging information and conducting coordination between NASA and DOD. I suggest that the operating procedures of these committees be reviewed. If the CMLC is organized as a coordinating unit in the area between NASA and DOD, it would appear that those groups which are established and have functions which are of a coordinating nature should become a part of the CMLC function in order that actions taken by the group can flow through the normal operating procedures of the CMLC. The minutes of such a group should be supplied to CMLC, indicating items considered and the actions taken. If any action should be of a nature that would materially modify the program or alter approved responsibilities, the actions should be transmitted to the Administrator and the Secretary of Defense for approval or disapproval. If these groups should have disagreements, the CMLC should be the first level to attempt resolution.

Those panels or groups that are in a technical advisory capacity to either agency on either the overall program or on specific projects should be responsive to the agency requesting the assistance.

I would further suggest that the Chairman of CMLC should be present whenever possible when discussions of programs in the aeronautical and space area are held between administrative-level people of NASA and DOD. The Chairman could assist in seeing that all of the facts are presented and such a meeting would provide an ideal time for the Chairman to introduce problems for discussion which he believes administrative people should be considering.

W. M. HOLADAY, *Chairman.*

MARCH 22, 1960.
Attachment (new proposed terms of reference).
This is a certified true copy:

JANE JOHNSON.

CIVILIAN-MILITARY LIAISON COMMITTEE TO THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AND THE DEPARTMENT OF DEFENSE

NEW PROPOSED TERMS OF REFERENCE

Organization

1. A Civilian-Military Liaison Committee is hereby established, pursuant to section 204 of Public Law 85-568, known as the National Aeronautics and Space Act of 1958, hereinafter called the act.

Objective

2. The role of the Civilian-Military Liaison Committee, hereinafter called the Committee, is set forth in section 204 (b) and (c) of the act as follows:

"(b) The Administration and the Department of Defense, through the Liaison Committee, shall advise and consult with each other on all matters within their

respective jurisdictions relating to aeronautical and space activities and shall keep each other fully and currently informed with respect to such activities."

"(c) If the Secretary of Defense concludes that any request, action, proposed action, or failure to act on the part of the Administrator is adverse to the responsibilities of the Department of Defense, or the Administrator concludes that any request, action, proposed action, or failure to act on the part of the Department of Defense is adverse to the responsibilities of the Administration, and the Administrator and the Secretary of Defense are unable to reach an agreement with respect thereto, either the Administrator or the Secretary of Defense may refer the matter to the President for his decision (which shall be final) as provided in section 201(e)."

Functions and authority

3. The Committee is authorized and directed to—

(a) Consult directly with any offices, agencies, and organizations of the Department of Defense and the National Aeronautics and Space Administration (hereinafter called the Administration) as appropriate on matters relating to aeronautical and space activities.

(b) Take such action and make such arrangements between the Department of Defense and the National Aeronautics and Space Administration as are necessary to perform the following functions:

(1) Provide a channel for official advice and consultation between the two agencies on all matters within their respective jurisdictions relating to aeronautical and space activities.

(2) Investigate, define and recommend solutions in possible areas of difference arising between the two agencies.

(3) Adjudicate jurisdictional differences between the two agencies.

(4) Provide the channel for formal communication between the two agencies except for privilege communications from the Secretary or Deputy Secretary of Defense to the Administrator or Deputy Administrator and vice versa.

(5) Encourage and facilitate informal contacts between agencies of the Department of Defense and the Administration at corresponding levels.

(6) Assist in coordinating joint use of services, personnel, equipment and facilities between the two agencies or use of these assets by one of the agencies on a loan basis.

(7) Suggest areas where joint investigation by the two agencies or areas where assistance of one agency by the other might prove beneficial.

(8) Assist in transfer of projects and facilities between the two agencies when jurisdictional determination has been made.

(9) Coordinate test requirements and proposals between the two agencies (funding and detailed support of test programs are outside Committee scope).

(10) As requested by the Administrator or the Secretary of Defense, interpret and evaluate technical, administrative, and budgetary aspects of projects and programs of mutual interest to both agencies and recommend desirable adjustments.

(c) Report the conclusions, findings and recommendations of the Committee, including successfully negotiated solutions and unresolved differences between the two agencies to the Administrator and the Secretary of Defense for concurrence and execution or further action.

Membership

4. The Committee shall consist of—

(a) A Chairman who is the head thereof and who is appointed by the President.

(b) Four representatives to be assigned by the Secretary of Defense. one of these representatives will be from the Department of Defense and one representative from each of the Departments of the Army, Navy, and Air Force.

(c) Four representatives to be assigned by the Administrator.

(d) The Administrator and the Secretary of Defense may appoint alternates to serve on the Committee in the unavoidable absence of the designated representatives.

Procedures

5. Rules of procedure for the Committee:

(*a*) The Committee shall meet at the call of its Chairman, normally once a month.

(*b*) The Chairman shall convene and preside over meetings of the Committee, direct the secretariat, and serve as a representative of the Committee, as required.

(*c*) The Chairman may, in case of temporary incapacity, designate one of the representatives to preside or act otherwise on his behalf.

Administration

6. The Chairman is authorized to—

(*a*) Establish a small secretariat consisting of one Assistant to the Chairman, who shall also serve as secretary to the Committee; and adequate stenographic-clerical staff.

(*b*) Draw upon the members of the Committee for ad hoc secretariat assistance for specific tasks. During such ad hoc assignments, personnel so assigned shall be acceptable to and solely responsible to the Chairman.

(*c*) Obtain administrative support for the Committee and the secretariat from the Administration and the Department of Defense as needed, including office space; facilities; budgetary, legal, and clerical help.

APPENDIX III

CIVILIAN-MILITARY LIAISON COMMITTEE TO THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AND THE DEPARTMENT OF DEFENSE

TERMS OF REFERENCE

Organization

1. A Civilian-Military Liaison Committee is hereby established, pursuant to section 204 of Public Law 85–568, know as the National Aeronautics and Space Act of 1958, hereinafter called the act.

Objective

2. The role of the Civilian-Military Liaison Committee, hereinafter called the Committee, is set forth in section 204(b) of the act as follows:

"The Administration and the Department of Defense, through the Liaison Committee, shall advise and consult with each other on all matters within their respective jurisdictions relating to aeronautical and space activities and shall keep each other fully and currently informed with respect to such activities."

Functions and authority

3. The Committee is authorized and directed to—

(*a*) Consult directly with any offices, agencies, and organizations of the Department of Defense and the National Aeronautics and Space Administration (hereinafter called the Administration) as appropriate on matters relating to aeronautical and space activities.

(*b*) Take such action and make such arrangements between the Department of Defense and the National Aeronautics and Space Administration as are necessary to perform the following functions:

(1) Provide a channel for official advice, consultation, communication, and exchange of information and maintain a flow of this information adequate to keep the Administration and the Department of Defense, including the military departments in their respective areas of interest, fully and currently informed of each other's aeronautical and space plans, programs, and activities.

(2) Investigate, define, and recommend courses of action where jurisdictional differences between the two agencies have arisen, or might arise, unnecessary duplication of effort might develop, or coordination of jointly sponsored or related programs is required.

(3) Encourage and facilitate informal contacts between agencies of the Department of Defense and the Administration at all levels.

(4) Assist in coordinating joint use of services, personnel, equipment, and facilities between the two agencies or use of these assets by one or the other of the agencies.

(5) Suggest areas for joint investigation by the two agencies of areas where assistance of one agency by the other might prove beneficial.

(6) Assist in transfer of projects and facilities between the two agencies pursuant to transfer of primary responsibility for the direction of an aeronautical or space activity.

(7) Coordinate requirements for launch and other developmental test facilities including scheduling between the two agencies (funding and detailed support of test programs are outside Committee scope).

(8) As requested by the Administrator or the Secretary of Defense, interpret and evaluate technical, administrative, and budgetary aspects of projects and programs of mutual interest to both agencies and recommend desirable adjustments.

(*c*) Receive copies of all written communications between the Administration and the Department of Defense (including the military departments).

(*d*) Report jointly to the Secretary of Defense and the Administrator the findings, conclusions, and recommendations of the Committee, including successfully negotiated solutions and unresolved differences between the two agencies.

Membership

4. The Committee shall consist of:

(*a*) A Chairman who is the head thereof and who is appointed by the President.

(*b*) Four representatives to be assigned by the Secretary of Defense; one of those representatives will be from the Department of Defense and one representative from each of the Departments of the Army, Navy, and Air Force.

(*c*) Four representatives to be assigned by the Administrator.

(*d*) The Administrator and the Secretary of Defense may appoint alternates to serve on the Committee in the unavoidable absence of the designated representatives.

Procedures

5. Rules of procedure for the Committee:

(*a*) The Committee shall meet at the call of its Chairman, normally once a month.

(*b*) The Chairman shall convene and preside over meetings of the Committee, direct the secretariat, and serve as a representative of the Committee, as required.

(*c*) The Chairman may, in case of temporary incapacity or absence, designate one of the representatives to preside or act otherwise on his behalf.

Responsibility and authority of the Chairman

6. The Chairman is authorized to—

(*a*) Exercise, with appropriate consultation with the Committee on recommendations to be made to the Administrator and the Secretary of Defense, all functions and authority of the Committee when the Committee is not in session. The Chairman shall make a full report of his activities to the Committee at each meeting.

(*b*) Establish a small secretariat.

(*c*) Draw upon the members of the Committee for ad hoc secretariat assistance for specific tasks. During such ad hoc assignments, personnel so assigned shall be acceptable to and solely responsible to the Chairman.

(*d*) Obtain administrative support for the Committee and the secretariat from the Administration and the Department of Defense as needed, including office space; facilities; budgetary, legal, and clerical help.

APPENDIX IV

DEPARTMENT OF DEFENSE,
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION,
CIVILIAN-MILITARY LIAISON COMMITTEE,
Washington, D.C., December 9, 1958.

Memorandum for the members of the Civilian-Military Liaison Committee.

Subject: Proposal for a joint DOD-NASA study concerning range and instrumentation support for the U.S. Space program and advanced missile program.

A study recently made for me, in my capacity as Director of Guided Missiles, resulted in a report to me making recommendations on this subject and a concurring letter from me to the Deputy Secretary of Defense, copies of which are attached.

In essence, it has been recommended that a joint study of the overall range requirements of the space program be undertaken by DOD-NASA representatives, to result in decisions and recommendations with respect to the following:

1. Nature, extent, and timing of projected military and civilian sponsored space projects.
2. Range-capability requirements forecast for the above projects (including launching, instrumentation, control, communications, and recovery).
3. Framework of an integrated worldwide operational facility, including tracking, control, and communications capabilities, suitable to meet the requirements of No. 2 above.
4. Phased time scale for the establishment of such a capability.
5. Recommendations for distribution of funding responsibility between DOD and NASA for the establishment and operation of such a capability.
6. Recommendations as to the agencies to establish and operate the capability.
7. Recommendations as to the organization and control mechanism needed to execute the proposed program.

I recommend that this study be initiated and accomplished as soon as possible and be carried out by a group subordinate and reporting to this committee. I request the members' views regarding this recommendation. If you concur, I request that you authorize me, as Chairman, to take the required steps to accomplish this action.

W. M. HOLADAY, *Chairman.*

This is a certified true copy:

JANE JOHNSON.

MARCH 23, 1960.

APPENDIX V

AGREEMENT BETWEEN NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AND DEPARTMENT OF DEFENSE ON GLOBAL TRACKING, DATA ACQUISITION, COMMUNICATIONS, AND DATA CENTERS FOR SPACE FLIGHT

1. The separate requirements of NASA and the Department of Defense for space tracking and data acquisition are recognized. The NASA requirements are primari y for research and development flights and the DOD requirements are primarily for research, operational flights and intelligence support.
2. Immediate and vigorous action is required in both agencies to implement the agreed-on national program.
3. It is agreed that the following actions be started in the current year:

(*a*) Provide tracking and data acquisition stations for deep space probes at Woomera, Australia, and South Africa using one of the existing 85-foot dishes. This will complete a three-station net including the existing NASA Goldstone facility for 24-hour coverage of deep space flights. These stations will be operated by NASA. High capacity data acquisition equipment will be required at these sites by the Department of Defense in the near future. The stations will provide for DOD requirements until the load increases so that parallel DOD equipment is required.

(*b*) Provide one of the existing 85-foot dishes in Spain and a secondary acquisition antenna with high capacity in Japan. These stations will be operated by the Department of Defense. These stations will provide for NASA requirements until the load increases so that parallel NASA equipment is required.

(*c*) Provide facilities required for Project Mercury, including those for injection, tracking, data acquisition, and reentry command. The NASA will provide and operate these facilities.

(*d*) Add four stations to the Minitrack network and modernize remaining stations to provide coverage for polar flights. NASA will provide and operate these stations.

4. The need is recognized for two closely cooperating data reception and analysis centers, one operated by NASA as a continuation and expansion of the Vanguard center and one operated by the Department of Defense under Spacetrack management at the Cambridge Research Center. These two centers will exchange data freely and provide mutual support for the national program.

5. The worldwide communications networks now in existence shall be shared equally by DOD and NASA.

6. A technical committee with representation from NASA and DOD shall maintain a continuing study and monitoring of the global tracking, data acquisition, and communications problems and periodically report their findings for action to the Secretary of Defense and the Administrator of NASA.

NEIL H. MCELROY,
Secretary of Defense.
T. KEITH GLENNAN,
Administrator, NASA.

WASHINGTON, D.C., *January 10, 1959.*

APPENDIX VI

DEPARTMENT OF DEFENSE,
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION,
CIVILIAN-MILITARY LIAISON COMMITTEE,
Washington, D.C., December 23, 1958.

Hon. NEIL H. MCELROY,
The Secretary of Defense,
Washington, D.C.

DEAR MR. MCELROY: The Civilian-Military Liaison Committee at its meeting of December 9, 1958, discussed the assignment of priority ratings to space projects. Included in the factors which the Committee took into consideration were the nature of the national urgency list as established by the President pursuant to action of the National Security Council, the results of the discussion concerning priorities which took place at the Space Council meeting of December 3, 1958, the type of hardware and services which will be needed by the manned satellite and the million-pound-thrust engine programs, and the urgency of these two programs.

At the conclusion of its discussion, the Committee (with the exception of the Army representative) agreed that the chairman should transmit to the Administrator of NASA and to the Secretary of Defense its recommendation that a DX priority should be sought for the manned satellite program. This recommendation was made assuming that the Vanguard and Jupiter C programs would be dropped from the DX category, and that the million-pound-thrust engine would be assigned a DO priority.

The Army representative reserved his position in this matter, on the basis that adding these programs to the DX list would lessen the effectiveness of the DX priority for the military programs on the list.

Sincerely,

W. M. HOLADAY, *Chairman.*

An identical letter was sent to Dr. T. Keith Glennan, Administrator, National Aeronautics and Space Administration.

This is a certified true copy:

JANE JOHNSON.

Mr. SISK. Mr. Chairman, just one further thing. Under the act your committee is authorized to proceed to do certain things. A little while ago in an answer to Mr. Van Pelt or to Mr. Riehlman, you stated that nothing had been referred to you recently. Now, it seems to me that somebody is in direct violation of a law adopted by the

Congress of the United States, because section 204(b) of the Space Act says this:

(b) The Administration and the Department of Defense, through the Liaison Committee, shall advise and consult with each other on all matters within their respective jurisdictions relating to aeronautical and space activities and shall keep each other fully and currently informed with respect to such activities.

This provision doesn't provide any flexibility whatsoever. It says the Administration and DOD shall do certain things through this committee. Now, they are not doing it. So, in my opinion they are in absolute violation of the law.

Mr. HOLADAY. I think in answer to your question, as I pointed out a while ago, the NASA and Department of Defense have always interpreted this section as meaning "a channel" or "one of the channels." They wanted the capability to deal directly with each other and this is——

Mr. MILLER. Would the gentleman yield?

Mr. HOLADAY. I can't answer your question any better than this.

Mr. SISK. The law reads pretty plainly, though, doesn't it, Mr. Holaday?

Yes, I will yield to my colleague from California.

Mr. MILLER. Who determined, Doctor, that there would be only one channel, or that there would be many channels?

Mr. HOLADAY. Sir, I was not present when the original charter was worked up, and I don't know who made these decisions.

Mr. MILLER. But decisions were made that there would be more than one channel.

Mr. HOLADAY. The original charter is very clear and it is continued into the revision of the charter that it is one or a channel.

Mr. MILLER. But not the only channel?

Mr. HOLADAY. Not the only.

Mr. MILLER. And you don't know who made the decision that there would be more than one channel?

Mr. HOLADAY. No, sir.

Mr. MILLER. Or do you know of any law providing for more than one channel?

Mr. HOLADAY. No, sir.

Mr. MILLER. That is all.

Mr. SISK. That is all, Mr. Chairman.

The CHAIRMAN. You do know, though, that you have authority under the charter which the President approved, to provide for additional channels? Your committee has the authority to provide for additional channels, does it not?

Mr. HOLADAY. Yes, sir, Mr. Chairman. It has been one of our points of discussion with both the Administration and Department of Defense that the many committees—I say many committees—that were established, some of them are still functioning, some of them never functioned, they were between NASA and ARPA, Defense and Army, Defense and NASA; it was our feeling, and we called it to their attention, that these committees which were doing a coordinating job, we felt, should, in effect, be appointed by or report to the CMLC because it was a function, we felt, of this watchdogging—this was never concurred in, so that they operated separately and independently.

Mr. MILLER. Never concurred in by whom?

Mr. HOLADAY. By the Administration or Department of Defense.

Mr. MILLER. The Administration or the Department of Defense. In other words, they are the ones that bypassed your Committee?

Mr. HOLADAY. Yes, sir. We will be glad to make available the correspondence in connection with this.

The CHAIRMAN. Let me read this into the record. This was approved by the President. Subsection 3 of the charter of the CMLC provides that the Committee has power to encourage and facilitate informal contacts between agencies. It seems to me that part of your duty is to provide contacts between agencies.

Mr. HOLADAY. Well, we provided contacts.

Mr. MILLER. He has provided it.

He wanted those contacts to report through his Committee, but the Administration and Department of Defense wouldn't allow him to do it; isn't that correct?

Mr. HOLADAY. Correct.

Mr. MILLER. There you go. It was not Mr. Holaday's fault. He was overridden by the Department of Defense and NASA.

Mr. FULTON. Mr. Chairman.

The CHAIRMAN. Mr. Sisk still has the floor.

Mr. SISK. No, go ahead, Mr. Quigley.

The CHAIRMAN. Mr. Quigley, do you want to yield to Mr. Fulton?

Mr. QUIGLEY. May I ask a question first?

Mr. Holaday, Congress set up the Committee of which you are chairman as the formal coordinating Committee between NASA and the Department of Defense on the Government's space program.

Mr. HOLADAY. That is your interpretation.

Mr. QUIGLEY. The point I am trying to establish is that Congress, 18 months ago, established the Committee which you head as the formal coordinating Committee between NASA and DOD to work out the problems which everybody anticipated would arise. We had a new agency coming into being which had to work, of necessity, with the Defense Department if we were going to accomplish anything in this space age.

Mr. HOLADAY. I don't believe I can go along with that interpretation, sir.

Mr. QUIGLEY. That it was the formal coordinating Committee?

Mr. HOLADAY. No, sir. You turned around and set up a Space Council, then you put some language in there about if the Secretary of Defense and the Administrator could not agree, they could go to the President. I cannot interpret, the way I read the law, that you set CMLC up as the Committee to do this negotiating.

Mr. QUIGLEY. Now, you are carrying my question further then I intended to take it. Sure, the Congress set up the Space Council, but that was designed to be an advisory council to the President on these problems. Sure, the act did provide that if problems should arise between NASA and Defense Department, which could not be resolved, that the heads of the two agencies, of necessity, would go to the President. But, as I read the law, your Committee was set up as the top expediter, the top coordinator, the one formal line of communication between these two agencies. I think that if it had functioned the way Congress had intended, the number of instances in

which the Administrator of NASA and the Secretary of Defense would have to go to the White House, would be reduced to a minimum, and if the ideal situation prevailed, they would never have to go. Now, what has happened is that someone in the administration decided that despite the fact that this was the one formal coordinating Committee under law there was absolutely no reason why there couldn't be 1 or 12 or 76 informal ones. The net result of this has been that your formal Committee, for all practical purposes, has been bypassed and allowed to die on the vine; is that correct?

Mr. HOLADAY. The last statement I agree with.

Mr. QUIGLEY. All right. And now the recommendation from the President is to do away with your Committee?

Mr. HOLADAY. Yes, sir.

Mr. QUIGLEY. I think the question that I am trying to get to is: 18 months ago Congress enacted into law a provision which established your Committee. Has it been tried and found wanting, or has it never really been tried?

Mr. HOLADAY. I am afraid it has never been tried.

Mr. QUIGLEY. I will yield to the gentleman from Pennsylvania.

The CHAIRMAN. Gentlemen, I have some requests from members of the committee. Some of the members fear that they are not going to be reached at all this morning. I am guilty of taking too much time.

Mr. QUIGLEY. May I yield to the gentleman from New York.

Mr. ANFUSO. Mr. Holaday, do you think if we simply amended the section of law which created your Committee, by striking out section (e), which you said limited your authority, that you would be satisfied?

Mr. HOLADAY. Under the circumstances——

Mr. ANFUSO. I said section (e), didn't I? I meant section (c) on page 8.

Mr. HOLADAY. I find it almost impossible under this type of questioning to respond to your questions and I think, I am also bothered to a great degree by the fact that my experience with the Committee has been very discouraging. I have not been able to resolve in my own mind before I came up here that changing, to a degree, some of the law might necessarily make it desirable to have this Committee. There is a great doubt in my mind as to whether this Committee is really necessary. The best I could do was to indicate that there was a need for somebody, or some method, to coordinate and attempt to use our facilities to the greatest efficiency. This question that you placed has been put to me several times this morning. I just don't have enough experience or background to really say this Committee is necessary.

The CHAIRMAN. Any further questions?

Mr. ANFUSO. So that even if Congress repealed section (c), you still don't feel the Committee should continue to exist; is that it?

Mr. HOLADAY. I didn't—you are putting words in my mouth to a degree there. I didn't say—I said that I did not believe that I had the experience to make a definite recommendation whether the Committee was needed or not.

The CHAIRMAN. Mr. Hechler?

Mr. HECHLER. I hope you are not discouraged, Mr. Holaday.

Mr. HOLADAY. Yes; I am, yes.

Mr. HECHLER. What I mean is, I hope you are not discouraged by this particular committee hearing.

Mr. HOLADAY. Oh, no; I am not discouraged by the hearing.

Mr. ANFUSO. I think he is satisfied with the hearing.

Mr. HECHLER. This has been a very helpful hearing, I think. It has brought out a lot of very useful and clarifying points. I wouldn't want anyone to leave the implication that you have been anything but a dedicated public servant in the way that you have attempted to administer the CMLC. I think the difficulties have come from other sources—namely, your lack of support from the administration.

Now, frequently you have mentioned here the necessity for having a team in this whole operation. The difficulty seems to be that some people on the team want to throw forward passes and others want to make end runs, others want to engage in purely blocking operations and some even, perhaps unintentionally, follow the route of Roy Riegels and run toward the opposite goal line. Now, what essentially you need here, it seems to me, is a captain of the team.

I don't want to pussyfoot around any. I think all these problems of coordination and duplication would be solved if the Chief Executive would make the clear-cut decisions which would insure the efficient utilization of our resources, which would eliminate the bureaucratic duplication and conflict and public confusion. But, short of that, I think I would agree with my colleagues who have suggested the need for some form of space czar, a supercabinet official. You say, Mr. Holaday, you don't think any man could do that. Our country is in a terrible crisis which demands that someone do that and if the President doesn't do it, we ought to set up the type of individual who can resolve these conflicts. Now, we have had examples in administrative history.

Mr. Knudsen, in 1941, with the Office of Production Management, succeeded by Donald Nelson with the War Production Board, we have had examples in the field of food with Chester Davis, Economic Stabilization with Fred Vinson both before the war, during the war and after the war. I think we are in an emergency and that we need this type of individual. Your testimony this morning has indicated very clearly to me that current mechanisms have failed and that we are going to have to take this step if our country is going to be safe in the future. I wouldn't embarrass you by asking you to try to refute that. I merely want to make this statement and ask if you care to make any comment on it.

Mr. HOLADAY. No, I don't believe I care to comment on it.

The CHAIRMAN. Any further questions?

Mr. HECHLER. Yes. I do have one further question. Under the Atomic Energy Act of 1954, there was established a Military Liaison Committee for the purpose of establishing liasion between the Atomic Energy Commission and the Department of Defense, which many observers believe has been extraordinarily successful in working out any conflicts between those two agencies.

Have you made a study of the experience of that Military Liaison Committee to try to apply any lesson learned to the CMLC?

Mr. HOLADAY. Well, I don't believe the two are quite related. In this particular case we took our atomic energy work in the very

early stages and put it in one agency and then put upon that agency the military requirements. You were working more with one end product as we visualized it in those days, than the many end products that we are dealing with here in space.

It, in the minds of a number of people, has been successful. I note in the list of people which you are calling before the committee, you are asking people who have had experience with it, to come here and talk. I believe that they would be much better qualified to answer your question than I am. I have a feeling that there is considerable merit in that type of an organization but whether it could be molded to fit what we have developed here in this space game, I don't believe I can answer that question. Maybe some of those people who are working with it every day, could answer it.

I understand Dr. Loper and a number of the other people are going to be over here to testify. I would not want to be an expert and say that this is, or is not, an ideal way to do it.

Mr. HECHLER. I want to repeat, I think you have demonstrated that you have been a very dedicated public servant who has tried to do what has amounted to an almost impossible job with the mechanism available.

Mr. MILLER. Will the gentleman yield? I would like to join in what Mr. Hechler says about Mr. Holaday.

The CHAIRMAN. Mr. Wolf?

Mr. WOLF. Mr. Chairman, I would like to associate myself with the remarks of the good Dr. Hechler from West Virginia on this question of the need for a space coordinator. I would like to ask Dr. Holaday, supposing this legislation, which I am opposed to, is enacted, what could be your plans for the future? Would you stay in Government service in some capacity?

Mr. HOLADAY. No, sir, I expect to be out of Government service in the very near future.

Mr. WOLF. Thank you.

The CHAIRMAN. What are your plans for the future? Has that been announced? I am not going to probe, but I am wondering why you are getting out. [Laughter.]

Mr. HOLADAY. My answer to that is: Why shouldn't I?

The CHAIRMAN. All right. Doctor, I want to thank you very much for coming here.

We may want to call you back later on because I don't think we have exhausted all possible questions. We may have exhausted you, but not the possibility of questions.

Mr. HOLADAY. I say you almost exhausted me on this cross examination.

The CHAIRMAN. Franklin W. Phillips, was to be a witness this morning. We will arrange to call Mr. Phillips back at some later date. Sorry we can't hear him this morning, but I am sure we are going to have some rollcalls this afternoon, so it would seem foolish to attempt to hold hearings this afternoon.

Mr. WOLF. How would the good chairman know that, as a matter of fact? [Laughter.]

Mr. HOLADAY. Mr. Chairman, could I raise one point?

The CHAIRMAN. Sure.

Mr. HOLADAY. You asked me for considerable information. On November 13, we supplied your staff, I believe, copies of nearly everything that you have asked for. They are available.

The CHAIRMAN. All right.

Mr. HOLADAY. If this information does not answer your questions, the staff can call us and we will be very glad to supply additional information.

The CHAIRMAN. Mr. Yeager, will you see to it that the record is complete? Where the record is deficient, the committee staff will request the needed information from Mr. Holaday.

Mr. YEAGER. Yes, sir.

The CHAIRMAN. Thank you very much, Mr. Holaday.

Gentlemen, I want to take up a certain matter in open session. NASA has invited the committee to go down to Cape Canaveral on March 30 and 31. They have scheduled three shoots down there at that time. It should be very interesting.

Now that we have gotten our legislative authorization out of the way, and we seem to be getting this matter whipped into shape—I wondered what the members might think of this proposed trip? I wanted to take it up in open session since this is an official trip, it is purely business.

Mr. MILLER. What dates are they, Mr. Chairman?

The CHAIRMAN. March 30 and 31. Mr. Ducander, what day of the month is that?

Mr. ANFUSO. Wednesday and Thursday.

The CHAIRMAN. Wednesday and Thursday.

Mr. DUCANDER. Yes, sir. We would go down on Wednesday afternoon. The shoots are scheduled for Thursday.

The CHAIRMAN. What is the pleasure of the committee?

We have been working hard. I think the committee is entitled to a change.

Mr. WOLF. I agree with that, Mr. Chairman. Has the Chairman established when the Civil Rights battle will be over?

The CHAIRMAN. I think it will be over by the 30th, either that, or we will be under the sod.

Mr. HECHLER. Mr. Chairman, I think the committee is moving with all deliberate speed.

Mr. MILLER. Mr. Chairman, I think we should accept the invitation. Of course, you never can tell what the legislative program is going to be this far is advance. We could always cancel out.

Mr. DUCANDER. They understand that.

The CHAIRMAN. They understand that.

Mr. MILLER. I think we should accept. I so move.

The CHAIRMAN. Before we vote on it, how many present here would be interested in going down to Cape Canaveral for those firings? Let's see how many we have—five, six?

Mr. DUCANDER. I had better get out a letter to the members, hadn't I, Mr. Chairman?

The CHAIRMAN. Will you poll the committee? You have heard the motion. If there is no objection, the committee will accept the invitation to go. In the meantime, we will check to see who will be available to go.

The next hearings will be Monday morning, and at that time we will hear James H. Douglas, Deputy Secretary of Defense.

Mr. DUCANDER. Mr. Chairman, we don't know that yet.

The CHAIRMAN. We have in mind the Secretary of Defense, but the Secretary has been in an automobile accident and he won't be able to come, I am sure.

Mr. DUCANDER. Mr. Douglas, then

The CHAIRMAN. Yes.

Mr. DUCANDER. All right, and Dr. York.

Mr. HECHLER. When will we hear Mr. Phillips?

The CHAIRMAN. As soon as we can get to him. We can't very well change our plans because Mr. Douglas, the Deputy Secretary of Defense, has canceled a trip overseas to be here Monday.

Mr. HECHLER. How about tomorrow? Couldn't we hear him tomorrow?

Mr. MILLER. No.

The CHAIRMAN. Let's work him in a little later on. If there is no objection, we will adjourn until Monday morning at 10 o'clock.

(Whereupon, at 12:01 p. m., the committee adjourned to reconvene at 10 a.m., Monday, March 14, 1960.)

TO AMEND THE NATIONAL AERONAUTICS AND SPACE ACT OF 1958

MONDAY, MARCH 14, 1960

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND ASTRONAUTICS,
Washington, D.C.

The committee met at 10 a.m., Hon. Overton Brooks (chairman) presiding.

The CHAIRMAN. The committee will come to order. It is exactly 10 o'clock so we are not late.

Does the press want to take any more pictures?

If so, we will suspend a moment or two.

You now have all you want? All right.

Gentlemen of the committee, we are happy this morning to have a friend of mine here today, the Honorable James H. Douglas, Deputy Secretary of Defense. Mr. Douglas was for years Secretary of the Air Force. I have had the pleasure of hearing his testimony regarding the needs of the Air Force in the past, and if he does as good a job for the Defense Department, he will maintain a high batting average.

So we are very happy to have you and Dr. York here today.

Now, you have a prepared statement, Mr. Douglas. Are copies of this prepared statement on all the members' desks?

Off the record.

(Discussion off the record.)

The CHAIRMAN. We want all the members to read the statement of the Secretary, whether they be present or not.

Mr. Secretary, if you will, then, we will be happy to have you proceed with your statement.

STATEMENT OF JAMES H. DOUGLAS, DEPUTY SECRETARY OF DEFENSE; ACCOMPANIED BY DR. HERBERT F. YORK, DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING; AND JACK STEMPLER, ASSISTANT GENERAL COUNSEL, DEPARTMENT OF DEFENSE

Secretary DOUGLAS. Mr. Chairman, I would like first to express the regret of Secretary Gates not to come before your committee at this time. The Defense Department, I assure you, regards the subject that you are exploring as an extremely important one, and we also look forward to the benefit of discussions with you and your committee and your views and suggestions in seeing that the solution we arrive at and you arrive at is the one that will assure the progress we need, not only in space for peaceful purposes, but in our defense programs.

The CHAIRMAN. We are proceeding, as you know, Mr. Secretary, under the President's message to the Congress of the United States. Since it was the subject of a special message of the President, we felt that it should be given priority before this committee.

Secretary DOUGLAS. I quite agree.

Mr. Chairman and members of the committee, I very much appreciate the opportunity to appear before the committee to discuss the proposed amendments to the National Aeronautics and Space Act of 1958.

The primary concern of the Defense Department with respect to space and the organization of our space activities is that our programs for the military utilization of space, and the research and development effort directed toward that end, assure our ability to do those things essential to our defense which can be done more effectively in space than elsewhere.

In his message respecting the proposed amendments, the President emphasized the fact that the Defense Department has ample authority to conduct research and development work on space-related weapons systems, to utilize space for defense purposes, and that nothing in the act should derogate from that authority.

The Defense Department supports the proposed amendments as it believes NASA should have a clear affirmative responsibility for the exploration, scientific investigation, and utilization of space for peaceful purposes.

There is an important national interest in space activities for peaceful purposes and they can be better pursued separate from military activities in space. Space exploration and scientific investigation of space for peaceful purposes should not have to compete for the defense dollar within the Defense Department or be confused with military requirements.

The Department also favors the elimination of the Civilian-Military Liaison Committee as it believes more effective coordination of programs and activities can be accomplished by direct communication and joint effort at all levels.

As the President stated in his message:

> We have come to the end of a transitional period during which responsibilities for a broad range of activities were being shifted to NASA from the Department of Defense and NASA's capabilities for discharging those responsibilities were being developed. From now on it should be made clear that NASA, like the Department of Defense in the military field, is responsible in the first instance for the formulation and execution of its own program, subject, of course, to the authority and direction of the President.

The new section captioned "Coordination and Cooperation," section 309 in the proposed amendments, among other things, emphasizes the need for efficient utilization of resources and directs the Administration and the Defense Department to consult with each other and keep each other fully and currently informed with respect to space activities.

The NASA programs in their probes of outer space, investigation of the solar system and our Moon, are properly separate from our defense activities in space. But there will continue to be need for a high degree of cooperation between NASA and the Defense Department for the solution of problems of mutual interest, and for the

exchange of information on requirements, technical data, and progress of programs. Also, areas of common interest and operation make close coordination imperative if duplication of effort is to be avoided.

I am satisfied that the most effective coordination of programs and activities between NASA and the Defense Department can be accomplished by direct communications between those having management responsibilities at various levels and in particular areas.

No substitute can be provided for direct and frequent communication between the Administrator, his Deputy, and his Associate Administrator, on the one hand, and the Secretary of Defense, myself, and the Director of Defense Research and Engineering, on the other.

I also regard it as important that a simple structure be established to assure a continuing prompt exchange of information and to coordinate development programs of mutual interest. Dr. Glennan shares this view.

As a method of implementation of the proposed section 309(c), I believe a structure to accomplish these purposes can be based upon an Activities Coordinating Board with the Deputy Administrator and the Director of Defense Research and Engineering as cochairmen, assisted by NASA and Defense officials appropriate to special areas calling for coordination such as launch vehicles, aerospace medicine, aeronautics, and payloads of mutual interest. These officials might well be chairmen of panels to deal in such areas as those mentioned.

I believe such a committee or board would be fully effective as it would carry the authority of its cochairmen who are within their respective agencies managers of the activities to be coordinated.

You may be confident, Mr. Chairman, that the Defense Department is deeply aware of its responsibilities and those of NASA and that it will cooperate closely with NASA looking to the success not only of the defense program but also of NASA's mission of peaceful purposes in space.

The CHAIRMAN. Thank you very much, Mr. Douglas, for your statement. We appreciate it very much.

Now, I understand Dr. York is here to answer questions.

Would you care to answer some general questions on policy before we hear from Dr. York?

Secretary DOUGLAS. I would be very happy to answer questions, Mr. Chairman. In some areas you will find Dr. York, I think, perhaps a better qualified witness than I am. But if we may have the privilege to answer questions and in some instances I will request Dr. York to answer questions, or of course the committee can address questions to him.

The CHAIRMAN. I would suggest to the members of the committee that the Secretary be asked questions of general policy, whereas Dr. York no doubt will be better able to handle questions of a more technical nature.

Mr. Secretary, I want to ask you this: Would you, in accordance with the President's suggestion, have Congress abolish the Space Council, and also abolish the Civilian-Military Liaison Committee?

Secretary DOUGLAS. That is correct.

The CHAIRMAN. Now, other than that, would you make any changes in the law?

Secretary DOUGLAS. I think the law, as presented, Mr. Chairman, is in form and substance, entirely satisfactory to the Defense Department.

The CHAIRMAN. Now, what would you recommend to replace the Space Council? Abolishing it would create a certain vacuum, wouldn't it?

Secretary DOUGLAS. Well, Mr. Chairman, I think that is particularly within the province of Dr. Glennan and the NASA management. I would think it was very likely that he would desire a scientific advisory board of some sort, but I would not see any need for statutory authority for such a group.

The CHAIRMAN. Well, under the law, the President is Chairman of the Space Council. I questioned the wisdom of making the President Chairman of that group at the time the Space Act was adopted, because he has such tremendous responsibilities already. Still Congress continues to place special responsibilities on him and I believe that no man can carry them all.

Secretary DOUGLAS. I think, Mr. Chairman, under particular and special circumstances it is proper to do things on a temporary basis that are not entirely suitable for the long term. I think that when the Space Act of 1959 was passed there was a new and extraordinary concern over the whole area, and at the time it seems to me it was not unnatural to set up a very special mechanism, but it seems to me also that it is no longer appropriate.

The CHAIRMAN. Now, you would recommend that the Civilian-Military Liaison Committee be abolished. And you would establish in its place an activities coordinating board with the Deputy Secretary on the board—that would be yourself?

Secretary DOUGLAS. No, sir. The Deputy Administrator of NASA——

The CHAIRMAN. Deputy Administrator, yes.

Secretary DOUGLAS. As a cochairman, and Dr. York in his present office would be the other cochairman.

The CHAIRMAN. So you would have one representative from each agency, and that would be an activities coordinating board. I noticed in reading over the charter, which was approved by the President for the handling of the work of the Civilian-Military Liaison Committee, that the CMLC was given ample authority—I shouldn't say ample authority—but given a lot of authority, in my judgment, and that committee has made certain recommendations, but these recommendations never have been acted upon.

Now, what assurance do we have that any recommendations, from this proposed activities coordinating board, will be acted upon, or given consideration?

Secretary DOUGLAS. Mr. Chairman, I am not personally very familiar with the development of the Civilian-Military Liaison Committee as it was established in the original act. I am not familiar with the history and the considerations that went into it. But I am perfectly clear in my own mind that it is the wrong kind of group to establish, for the purpose of coordinating the programs of two such agencies. It was created as a channel of communication and given authority to suggest and recommend.

Now, it seems to me that when you create a sort of third party to operate between two great agencies, you are much more likely to hinder normal communication at all levels than you are to assist it.

The CHAIRMAN. Let me break in, if I may. Would not the proposed activities coordinating board also be a third party?

Secretary DOUGLAS. Not the same at all, sir.

The CHAIRMAN. Not to the same extent perhaps, but it will be a third party, just the same.

Secretary DOUGLAS. But there is a great distinction. In the first place, I would not provide for it in the statute. I would insist on some assurance that some such provision for coordination was intended, but the board or committee that I am suggesting is wholly different in one particular respect, or in one outstanding respect, and that is that it would combine, on the board, as the cochairmen, the men who have management authority in each agency. A liaison committee of the kind that was set up had no authority, and if you tried to give it authority you would have put it in the position of trying to run a part of the Defense Department business and trying to run a part or all of the NASA business.

The CHAIRMAN. Well, now, I would say this: The whole program is still brand new to me, and I think that the developments in this program are going to dwarf anything that has thus far been achieved.

But assuming that the Civilian-Military Liaison Committee is eliminated, and this activities coordinating board is substituted, will you be able to reach the problems and bring them to the attention of the right people?

We have had enough bickering back and forth from the Department and NASA. We want to eliminate it.

Secretary DOUGLAS. Now, this coordination can present very real problems and it will present problems that result in disagreements from time to time. But I see no very unusual difficulty in this kind of coordination.

What I want to be sure of is, first, that Dr. Glennan, when he has a problem and wants immediate attention, will call Secretary Gates or myself or Dr. York on the telephone and sit down with us. This we do have very frequently.

Then, I think you do need a structure with some regular, prescribed duties which will assure a review of programs by each of the agencies and which from time to time can bring up particular problems and come up with a solution.

Now, actually at the present time there are project boards where there are representatives of the Defense Department and NASA dealing with a particular project. There will continue to be that kind of coordination. And, as I indicated, I foresee that there will be several panels or subcommittees dealing with particular areas.

Now, the two efforts in space by the Defense Department and by NASA are understandable as different entities. They have different purposes and there is no question in my mind but that there is a very great advantage in having them separated.

The situation that presents the problem, as I see it, is that NASA, in most of its exploratory and investigative work for several years will be using boosters or launch vehicles that have been developed by the Defense Department and are available through the Defense

Department or contractors of the Defense Department, and we have to have an orderly planning to assure that NASA's requirements can be met and that meeting those requirements are scheduled so that they do not present any serious difficulty to the Defense Department. And I don't see that there need be any very serious problems as long as you have top management personnel sitting down so that the committee, in its deliberations, can really make decisions when there is agreement, and proceed without the problem of having a third party liaison group come up with a question of authority or the problem of persuading the agencies to proceed in accordance with its recommendations.

The CHAIRMAN. Mr. Secretary, I have exceeded my time.

Mr. McCormack?

Mr. MCCORMACK. I pass for now.

The CHAIRMAN. Mr. Anfuso?

Mr. ANFUSO. Mr. Secretary, Mr. Holaday felt that he was being bypassed, that he was not being consulted, and that decisions were made without his committee being able to make any decisions or bring the parties together, as provided under section 204(c) of the act.

In other words, he felt that subsection (c) nullified subsection (b). What is your opinion on that?

Secretary DOUGLAS. Well, as I understand it, I don't think that the Civilian-Military Liaison Committee, over which Mr. Holaday presided, had any real authority, except to suggest and recommend, and its principal function was a channel of communication between the Administrator and the Secretary of Defense. As I have indicated before this morning, I think that this is a type of coordinating effort that is very likely to be ineffective and frustrating, not only to the Chairman and the members of the committee, but also to responsible managers in the agencies which they seek to coordinate, because it is an extra layer to move through. And when I have expressed my views on this, I would be very happy to have Dr. York, perhaps, tell a little about his experience of trying to use the Committee.

I think on both sides it has been found very difficult to use the Committee as a channel when you had particular problems to deal with and you could deal with the responsible people in the other agency directly rather than through a group that, in effect constituted a rather narrow funnel for communication between people at all levels and in all areas.

Mr. ANFUSO. Mr. Secretary, I don't want to interrupt you. We are operating under a limited time here.

Secretary DOUGLAS. Right, sir, excuse me.

Mr. ANFUSO. Wouldn't you say it was the intention of Congress to have the Civilian-Military Liaison Committee act as the go-between for NASA and DOD, and to be the voice that would ultimately go to the White House? Wasn't that our intention in the act?

Secretary DOUGLAS. I don't think—I didn't understand that the old committee was expected to go to the White House. It was my understanding that the Secretary of Defense and/or the Administrator were expected to go to the White House when there was disagreement as to roles and missions and other problems.

Mr. ANFUSO. Well, then, you agree with me that subsection (c) nullifies subsection (b)?

Secretary DOUGLAS. I think it does, to a degree.

Mr. ANFUSO. All right. Now, I am worried about what you are saying about section 309. I have no doubt that the Defense Department is going to ask to do research on projects beneficial to the military, and that NASA is going to continue to do research on matters pertaining to the peaceful uses of outer space.

But since both the military aspects and civilian aspects are closely related, there is bound to be disagreement at times as to what projects should be pushed forward first. Would you agree on that, sir?

Secretary DOUGLAS. Well, I am sure there will be some instances of disagreement. But my——

Mr. ANFUSO. Let me take that answer for a while.

Secretary DOUGLAS. Right.

Mr. ANFUSO. Now, if there are disagreements, then one of two things can happen. The first thing is that the coordinating board you spoke of will say: "All right let's go ahead with this military project on our side, and NASA, you go ahead with your project on the other side, we will both go ahead with these different projects in order not to disagree."

But there may come a time where getting together on one single project, such as some special project which would be beneficial to both the military and civilian, would save the taxpayers money. Now in that case don't you think that somebody should be above these two agencies to make the decision? Of course, you are going to say that the President, under subsection (b) of section 309, will make that decision; is that correct, sir?

Secretary DOUGLAS. That is correct. That is the only place you could go after trying to work out agreement through the machinery suggested.

Mr. ANFUSO. Right. Now, as the chairman has brought out, the President is a very busy person. He has other matters to attend to. He has the matter of the balancing of the budget, and other problems, besides this race into space. So it is a question of whom he will favor, whether he will favor Defense at a particular moment or NASA. Don't you think whether it be in the White House or elsewhere, that there should be some special person, some outstanding person—I don't know whether you want to call him a "czar," call him whatever you like, who will be responsible for making decisions of this kind, subject to being overruled by the President only?

Secretary DOUGLAS. No, sir, I don't. I don't think that we are faced with a situation which justifies a new layer and which would create what to me would be entirely unsound, and that is an individual who was charged with running an important part of Defense Department business and, in effect, the space effort for peaceful purposes.

Now, I don't find myself concerned with the fact, which is of course true, that no one is more overburdened than the President. We shouldn't have to go to the President frequently.

Mr. ANFUSO. That is exactly what I am trying to avoid.

Secretary DOUGLAS. But when we had a real reason to, I would have no hesitation in doing it, and my experience is that it can be done very satisfactorily.

Now, at the present time this relationship between NASA and the Defense Department has been shaking down very satisfactorily, and I

don't think there are any real areas of disagreement that are affecting either program at the present time.

I think I ought to say one thing which I am sure the committee will recognize, with respect to Mr. Holaday's situation. Mr. Holaday, who has played a very useful part in various offices in the Defense Department in recent months, has found himself the Chairman of a Committee which the administration proposes to eliminate with a bill that was being sent up to the Congress. This creates a situation where you turn away from the machinery that was provided and operate directly or through other machinery.

Mr. ANFUSO. I will say this, Mr. Secretary, Mr. Holaday is going to leave Government very much disappointed and disturbed and dissatisfied, because his Committee wasn't given a chance to operate. And I don't think that we can afford that in this day and age.

Now, without going any further into that, just let me conclude by this statement——

Mr. MCCORMACK. Will the gentleman yield?

Mr. ANFUSO. Yes.

Mr. MCCORMACK. You are politely telling us that you deliberately downgraded——

Secretary DOUGLAS. No; I am just commenting on what I think are the facts of life.

Mr. MCCORMACK. I know.

Secretary DOUGLAS. When a decision was made which was not a Defense Department decision, he was in a situation where he couldn't expect to participate fully. Now, I think this——

Mr. MCCORMACK. That started immediately after the bill became a law, didn't it?

Secretary DOUGLAS. Well, I would say that that was not so, Mr. McCormack, but I had very little personal experience with the activities of the Committee, which I know were not very many, even from the start.

Mr. MCCORMACK. Right——

Secretary DOUGLAS. Now, I think, actually, I might say that Mr. Holaday has expressed to me on various occasions his doubt as to whether the Committee could ever be very useful, and although I noticed in his testimony he said he thought the Committee should be continued, he, himself, expressed very serious doubt as to whether it should be continued. And in talking to him, myself, after his appearance we discussed the very real need for coordination and although I don't want to commit him to a view, I believe he thought that the kind of mechanism which we suggest developing could and would accomplish coordination.

The CHAIRMAN. The gentleman's time has expired.

Mr. ANFUSO. This is my last question.

Mr. Secretary, just let me conclude with this statement and question. As I see section 309, a coordinating board is going to result if that section is adopted. On one side there will be one or two members who will be interested in the military aspects, and on the other side there will be NASA representation interested in the peaceful exploration of outer space.

Now, you know that the President is economy minded, he is interested in balancing the budget, and you know also that even within the

Defense Department we have had a lot of friction among the services, so that there is bound to be friction between NASA and the Defense Department, and the question of money is going to come up. NASA may have a project which will cost so much money, the Defense Department will have another project costing still another sum of money. Now, somebody is going to have to make the decision whether we should go ahead with both projects or take one or the other. If you don't have somebody making the overall decision, what will happen is simply this: You are not going to get agreement, you are not going to get a proper decision to an important question.

The CHAIRMAN. The gentleman's time has expired.

Secretary DOUGLAS. This is a question that has arisen very frequently. Up to date these questions have been solved I think with satisfaction to NASA and to the Defense Department without taking it any further.

The CHAIRMAN. Mr. Bass.

Mr. BASS. I should like to ask Dr. York to comment on this colloquy between the the Secretary and the Congressman.

Dr. YORK. Well, we have this problem which Mr. Anfuso was anticipating, has indeed happened quite a number of times in the past, and the issue has always been settled directly between the Department of Defense and NASA. At least we have always found it possible—we have always settled these things. That was the case with the meteorological satellite, the navigation satellite, the communications satellite, the superboosters, and so on.

Mr. BASS. Dr. York, Mr. Holaday testified that he thought that all research and development in relation to space activities should be in one agency, preferably NASA. I gather you don't agree with him on that?

Dr. YORK. That is right, I do not agree.

Mr. BASS. Could you tell us why?

Dr. YORK. Well, because—this incidentally depends on what you mean by research and development; but if you mean to include by research and development the development of the payloads that are associated with our reconnaissance programs, with our missile early warning programs, and so on—these developments must be made in the agency that is going to ultimately employ these instruments for their final purpose.

Mr. BASS. So that——

Dr. YORK. Incidentally, most of the research and development has nothing to do with what people normally think of as being space. Most of this research and development is on data acquisition, data transmission, data reduction, and data analysis, as opposed to rocketry, for example.

Mr. BASS. Mr. Holaday has told us that he felt there will be additional rivalry and duplication; Dr. York, as the head of the research and development program in the Department of Defense, that has not been your experience to date?

Dr. YORK. Well, no; that is always a problem, but that is why we have to have people—that is why we have to have some people assigned the job of trying to coordinate and manage the programs; that is, it is always a potential problem.

Mr. BASS. That is all, Mr. Chairman.

Secretary DOUGLAS. Mr. Chairman, could I give an example which I think would be very helpful with regard to management——

The CHAIRMAN. Surely, anything you want to——

Secretary DOUGLAS (continuing). That hasn't required any carrying problems up for decision?

We have, for perhaps some 5 or 6 years now, done most of our guided missile test work at Cape Canaveral, which is now referred to as the Atlantic Missile Range, and it has launch sites for projects that have been Army projects, Air Force projects, and Navy projects, and now NASA projects.

For years, now, this range has been under the direction of an Air Force general, Major General Yates. There have been, I would think, all the occasions for conflict in scheduling and location and in all the problems of putting together, in effect, under one roof, contractors and services and a civil agency, all interested in their own projects, and to my knowledge General Yates has solved all the conflicts that have arisen between the claimant agencies, and none of those problems have ever come into Dr. York's office or my office.

Dr. YORK. That is generally right; yes.

Secretary DOUGLAS. Yes.

Mr. MCCORMACK. You said never and Dr. York says that it generally right. Will you reconcile those——

Dr. YORK. I do recall one that came in, but I think, considering the number of years and considering the problems, that it is the exception that proves the rule, rather than proves to the contrary.

Secretary DOUGLAS. If there would have been a half dozen, it would still be a fine record. I had thought there were none.

Mr. MCCORMACK. I just wanted to reconcile those two statements.

The CHAIRMAN. Mr. Secretary, offhand I can tell you of one problem that I don't believe your committee is going to be able to solve, and that is the Nike-Zeus problem. I think you will find some on one side and some on the other.

Secretary DOUGLAS. That is not a range problem, this is a weapons system problem. This is one of the most active problems that the Secretary of Defense has, and one of the most active problems that Dr. York and I have.

But the Liaison Committee has nothing to do with that and, really, the management of their program and our program might conceivably have questions arising out of a project such as Nike-Zeus, like it does out of other projects with respect to ground handling equipment, tracking equipment, and so forth. But that is not an indictment of the present organization.

The CHAIRMAN. Mr. Hechler.

Mr. HECHLER. I am very interested in this Activities Coordinating Board, Mr. Secretary, which you have proposed. I just hope, and I know you share this hope, that this doesn't turn into what I once heard as the definition of a board: Something that is long and narrow and wooden. I hope that it will be the kind of board that has some authority.

Now, aren't you, however, simply abolishing one committee, the CMLC, and replacing it with another committee?

Secretary DOUGLAS. No, sir; not a bit. The character of the two boards or committees I am sure is so essentially different that there is little to compare between the two, except perhaps a general purpose.

I emphasize, again, that the basis for my urging the kind of committee or board that we are talking about is that on that board, which would be a small board, will be the people who are responsible for management of the programs, can talk it over and when they have talked over a solution they can carry it out without talking to anyone.

Mr. HECHLER. All right.

This is essentially what concerns me very deeply, because when General Power testified, from his particular point of view, the President commented that his point of view was parochial rather than providing an overall picture.

Now, what you are doing here is essentially taking the Department of Defense, which has its point of view, NASA, which has its point of view, and in the nature of the beast you are going to create conflict, unless you have someone up above who will provide independent leadership.

You have said at the top of page 3: "Here we need cooperation, exchange of information, and coordination."

I think what this Nation needs is not cooperation, coordination, and exchange of information; it needs leadership; it needs someone who can set the goals, who can anticipate the conflicts before they come up.

And you have here, I think, created an organization which simply has representatives of two potentially conflicting organizations without anyone above who can make the decisions.

Secretary DOUGLAS. They are not essentially conflicting. Their purposes are different but they will both be interested in the know-how and some of the hardware that the other organization is producing.

Under the proposed amendments you will look to Dr. Glennan to establish, and get approved in the executive department, the significant type of program for exploration, scientific investigation, and utilization of space for peaceful purposes.

Now, his program is pretty well outlined at this time. I don't know to what extent he has outlined it to this committee, but it is an understandable program. The things he expects to do, do not provide obvious points of serious conflict with the military.

And, in the military, we have now shaken down a pretty firm program to develop weapons systems that rely on space. We are interested only when we think we can do something better in space and we can do it another way.

In Dr. York's office, he has several different divisions interested in space accomplishments because one may be warning, which is of particular interest to air defense, in the broadest sense, and one may be a strategic system.

Now, there isn't the serious conflict that people are inclined to think there is when we deal in generalities and just put the space descriptive word on each of them. They are both aimed at and devised for particular purposes.

Mr. HECHLER. I believe that this act considerably clarifies the roles of both the Department of Defense and NASA, but it, in a sense, makes them more independent and creates potential conflict because there is no real way to have an independent authority, who can supply di-

rection, not simply exchange of information and coordination, but direction.

I would go along with Mr. Anfuso on saying that there is need for someone above to supply this direction. I think there are a number of examples in history. In the field of rubber during the war, in the field of food with Mr. Chester Davis, in the field of war information with Mr. Elmer Davis, in the field of economic stabilization, with Jimmy Byrnes, who was in the White House, who supplied this direction over a potentially conflicting field.

Secretary DOUGLAS. At that time, I think it is important to remember there were shortages of almost everything and one of the major problems was the allocating of resources to meet every urgent demands.

Now, we have urgent demands but we have no serious problem of shortages.

Mr. HECHLER. I would like to suggest there is a shortage of leadership.

Secretary DOUGLAS. Sir, this is an opinion to which you are very well entitled. I, myself, am very optimistic about the leadership that Dr. Glennan provides and is exhibiting in the establishment of a space program for peaceful purposes.

And I am very happy that the Defense Department relies very largely on Dr. York to coordinate the requirements of the military services for various space activities.

Mr. HECHLER. I have full confidence in Dr. Glennan and Dr. York. It is at the level above them where leadership is needed.

The CHAIRMAN. The gentleman's time has expired.

Mr. Fulton.

Mr. FULTON. The question comes on the past history, especially in relation to the statutory provision——

Secretary DOUGLAS. I am sorry, I can't hear you.

Mr. FULTON. I say, the question comes as to the past history, especially as to the statutory provisions, section 204(a) of the original NASA Act of 1958 providing for a Civilian-Military Liaison Committee.

After paragraph (a) has set up the method of organizing a civilian-military liaison committee, there is the provision "Administration and the Department of Defense through the liaison committee shall advise and consult with each other on all matters within their respective jurisdictions relating to aeronautical and space activities and shall keep each other fully and currently informed with respect to such activities."

You will notice there are two parts to that. The first is, there is a mandatory "shall advise and consult with each other on all matters within their respective jurisdictions relating to aeronautics and space activities." That is a requirement of the law, under which there must be close cooperation between the high officials of the Department of Defense and the leading officials of the NASA. I don't quite see why the channel that Congress has provided in section 204(b) should be completely dried up.

I might say I disagree with my good friend Mr. Anfuso of New York, as well as with Dr. Hechler, on the idea of appointing an outside person with capability of administrative decision who would be a buffer between two Cabinet members and the President.

I think that would probably be putting a layer in at a different place than you have in mind. I don't think there should be an administrative layer over any segment of a Cabinet officer's responsibilities that comes between him and the President, and likewise with regard to a specific agency such as NASA.

I don't think that the head of the agency should have any portion of the jurisdiction of that agency divided off with a superdecisionary, with one foot placed in one department and the other an agency, beyond the control of the heads of the agencies.

I think that derogates from administrative efficiency. On the other hand, taking the situation just as it is, under the law, I do think that there is a need for day-to-day contacts through an outside committee whose members are not under the supervision directly of the heads of the Department of Defense and of the NASA agency.

For example, as a matter of background, the various services have liaison officers to Congress. These offices are set up for the purpose of liaison.

I am sure that Congress felt that this office of liaison was to act in an advisory capacity, a conciliatory capacity, so that a good many of these things could be handled before deep divisions occur.

I like particularly the fact that section 204(a) subsection (1) provides that the chairman as an appointee of the President. He sits there with a Presidential appointment, he has a hat put on him by the President. With him are the representatives from the various services as well as from NASA.

What is so wrong with that? Why have they bypassed it completely? Not that you must always use the channel, but it has just dried up. That is my question.

Secretary DOUGLAS. I think, Mr. Fulton, I addressed myself to that question before you came in. I am happy to have the opportunity to try to explain my view again.

Mr. FULTON. I was testifying before the Education and Labor Subcommittee this morning.

Secretary DOUGLAS. Right, sir.

The CHAIRMAN. Let him answer it again at this point.

Secretary DOUGLAS. First, I would like to say I am sure there was no effort that was a conscious effort not to follow the direction. The Committee, certainly, reviewed programs and in at least one instance devoted itself to the kind of study that I would think any coordinating committee would spend time on, and that was a study of really the time scheduling of the X–15 and Dynasoar and the Mercury project to validate the fact that they were all doing things that were supplementary and not conflicting things.

Now, this was done. But I am sure that you will find, if you question Dr. Glennan, or if you question Dr. York, who has had the Defense Department side of the problem for, really, the whole period of time, that the Committee didn't provide a normal method of doing business.

Any able group can play a part and make some contributions, but the important thing, from my point of view, is that you don't bring in a group that has no responsibility except to inform or advise or act as a channel.

Dr. Glennan, Dr. York, myself, and I think you will find the service research and development people interested in the matter, are satisfied that the important ingredient to a group that gets together between the two agencies is existing management responsibility in the people who get together.

There is then no need to persuade or to report or to take the time involved, that is involved when a third group considers the positions of two agencies, reaches a conclusion and reports.

I personally am satisfied that the kind of mechanism that we are suggesting, without being exact as to its form, can be fully effective in producing the coordination that we are looking for.

If there was every—well, there are any number of situations, whether it is in civil life or in Government enterprise, people get together, iron out their requirements, iron out their capabilities together and proceed, without conflict, to perform, without anyone being brought in with a new authority or any third person being brought in as a coordinator, and I am sure we can do it in this situation very satisfactorily.

Mr. FULTON. The select committee that preceded this committee heard several people from the Department of Defense, particularly the Air Force, and also people from NASA, in an attempt to work out some problems on scheduling. The select committee outlined some policy under Mr. McCormack's direction. All we did was talk it out, and by the time we had talked it over it was pretty well worked out among them.

Now, why couldn't the Chairman of the CMLC be that kind of a catalyst? I think it worked for the select committee. I think Mr. McCormack may remember.

The CHAIRMAN. The gentleman's time has expired.

Mr. McCormack.

Secretary DOUGLAS. If he is a wise, able negotiator, he may very likely work out excellent solutions. But my feeling is, you don't need him. I would rather undertake to sit down myself with Dr. Glennan or see Dr. York sit down with Dr. Dryden, or whoever is in the top spot, and they are the people who know the requirements of the programs and who know what they are trying to accomplish and can come up, in the shortest time, with a satisfactory answer.

The CHAIRMAN. Mr. McCormack.

Secretary DOUGLAS. I would be——

Mr. MCCORMACK. Is he through?

The CHAIRMAN. Yes.

Aren't you through?

Secretary DOUGLAS. Yes, sir.

Mr. MCCORMACK. Mr. Secretary, let's come to this bill, page 9. Is the Defense Department satisfied with that language?

Secretary DOUGLAS. What section, Mr. McCormack?

Mr. MCCORMACK. Section 309.

Secretary DOUGLAS. Right.

Mr. MCCORMACK. 309 (a), (b), (c), and so forth.

Secretary DOUGLAS. Yes, sir; I am satisfied with it.

Mr. MCCORMACK. I said is the Defense Department satisfied with it?

Secretary DOUGLAS. Yes, sir.

Mr. MCCORMACK. And you speak for the Defense Department?

Secretary DOUGLAS. Yes, sir.

Mr. MCCORMACK. All of the branches?

Secretary DOUGLAS. Yes, sir. This doesn't mean that everyone in the Defense Department will agree with the Secretary and myself.

Mr. MCCORMACK. I understand that.

Secretary DOUGLAS. Right.

Mr. MCCORMACK. But I mean the official position of the Defense Department.

Secretary DOUGLAS. Yes, sir.

Mr. MCCORMACK. And that means all the branches, you speak for them?

Secretary DOUGLAS. That is correct.

Mr. MCCORMACK. They are satisfied with that language?

Secretary DOUGLAS. That is correct.

Mr. MCCORMACK. What does the phrase "utilization of space" mean? I want something for the record from the Defense Department.

Secretary DOUGLAS. As I see it, sir, Defense activities involving the utilization of space can't be given an absolutely exact definition, but I would say it means two things: It means a utilization of space outside the atmosphere and not dependent upon the atmosphere for the particular operation that one is considering, and, generally, I would say that space activity involves a vehicle which can be put in orbit, is in orbit, or is on a trajectory directed to some planet or outside body.

Mr. MCCORMACK. Now, the development is different than research, isn't it? That is basic research.

Secretary DOUGLAS. I would say that we speak of research and development to cover a full process that includes both basic research, which deals with scientific fields, sometimes without direct relationship to an application, and development is the proper word to describe our going ahead after decision with an article or item that we have a specified use for.

Mr. MCCORMACK. So, development and utilization are connected with one another?

Secretary DOUGLAS. Yes, I think so.

Mr. MCCORMACK. Yes.

Now, you come to the conduct of supporting research connected therewith. Who is going to decide the question on supported research connected therewith? Suppose there is disagreement?

Secretary DOUGLAS. I am sorry, sir.

Mr. MCCORMACK. Suppose there is a disagreement on what constitutes supporting research connected with utilization of space and the development of weapons systems, who is going to decide that?

Secretary DOUGLAS. There could be situations where we might think it entirely proper that there be study research efforts in the Department of Defense and also in NASA, and as to the decision I have confidence, myself, that these could be ironed out between the Administrator and the Secretary.

Mr. MCCORMACK. Well, you are going to have somebody representing the Secretary of Defense, either an individual or committee, at some time, and somebody representing the Administrator of NASA, with all their manifold duties, aren't you?

Secretary DOUGLAS. Yes, sir.

Mr. MCCORMACK. You have many committees in the Defense Department, and there are many in NASA.

Secretary DOUGLAS. Well, as to committees concerned with this problem there would not be many committees, sir.

Mr. MCCORMACK. Well, you are not going to have direct contact all the time?

Secretary DOUGLAS. No, sir, that is right.

Mr. MCCORMACK. Of course not.

Secretary DOUGLAS. I have suggested a method of coordinating programs and reviewing programs which puts great reliance on the ability of the responsible managers of the programs to get together. They would be assisted by personnel of both agencies charged with special responsibility in each field or area, whether, as I have indicated, it is in propulsion or payloads or aeromedicine or aeronautics.

Mr. MCCORMACK. Then, if you recommend that this Liaison Committee be abolished, and that is what is recommended, why shouldn't we abolish all statutory committees relating to any department or agency?

Secretary DOUGLAS. Mr. McCormack, I might find that there are quite a few that I would agree could be abolished.

Mr. MCCORMACK. Why not all of them?

Secretary DOUGLAS. But I wouldn't want to generalize my views on this particular situation concerning which I think I am somewhat informed to any other situation without studying it.

Mr. MCCORMACK. Nobody is questioning the honesty of any one of you gentlemen.

Secretary DOUGLAS. I understand that, sir.

Mr. MCCORMACK. Please don't have any misunderstanding on the question that is asked.

Secretary DOUGLAS. Not a bit.

Mr. MCCORMACK. We know you are dedicated men and we know you are dedicated Americans, so that question is not involved in any of these questions.

Secretary DOUGLAS. No, I intended to say simply that I couldn't generalize from my views on this particular problem.

Mr. FULTON. Mr. McCormack, would you yield for a specific question?

Mr. MCCORMACK. Sure.

Mr. FULTON. Would you say, then, that the Department of Defense-Atomic Energy Commission liaison mechanism has been ineffective and should be abolished?

Mr. MCCORMACK. That is what I had in mind.

Secretary DOUGLAS. No. I think that the liaison committee that operates for the Department of Defense with the Atomic Energy Commission performs a very useful function.

There you have the head of the Committee wearing two hats. In one instance, he is a Special Assistant to the Secretary, and has very real authority in that capacity, and his Committee is entirely made up of members of the Defense Department. The situation seems to me to be wholly different.

There it is a problem of providing a useful channel between the customer and the producer. The Atomic Energy Commission is the producer, and the Defense Department, for a large variety of its

wares, is the customer, and it is essential to have a simple channel through which requirements can move from one direction and capabilities can be studied and expressed from the other.

Mr. McCormack. Is it fair to say, Mr. Secretary, that this liaison Committee has not been given a fair test during its existence?

Secretary Douglas. Mr. McCormack, I would hesitate to think I was qualified to answer that question very definitely because I personally have not been in a position to see it operate.

I suggested before that Dr. Glennan or Dr. York might give the Committee helpful views on that very question.

Mr. McCormack. Dr. York is right there.

Dr. York. I don't know how to say whether it has been given a fair chance or not, Mr. McCormack. In general, whenever a difficult problem has come up it has always been much quicker and easier just simply for me to call Dr. Glennan or Mr. Horner or whoever was appropriate, on the telephone, or for them to come over and meet with the Secretary or Deputy Secretary and myself to try and resolve it.

But I don't know how to answer whether it was given a fair chance. A number of things were put through the Committee, but it never—it never seemed to be the efficient or to be the fast way to solve the necessary problems.

The Chairman. The gentleman's time has expired.

Mr. McCormack. I realize that, and I was trying to assimilate that answer.

Mr. Fulton. I ask unanimous consent that the gentleman be given 3 additional minutes.

Mr. McCormack. I don't want any more time.

The Chairman. The gentleman doesn't want any more time?

Mr. McCormack. Thank you very much, but I think it is only right that we go around.

The Chairman. Mr. Chenoweth.

Mr. Chenoweth. Mr. Secretary, I am personally happy to see you before the Committee. We haven't forgotten the work you did as Secretary of the Air Force. We had many contacts. I know you are rendering an equally valuable service now as Deputy Secretary of Defense.

You mentioned you were optimistic over the general program now, and I am happy to hear you make that statement.

Now, I think we need statements like that occasionally to counteract some of these claims and charges that are being made that everything is chaos and confusion in the whole space program.

I think the event last week proves that somebody is doing a little work. At least, somebody is moving along in this program. So I was very much interested in your statement.

Maybe you would like to elaborate on it?

Secretary Douglas. Pioneer V was a very fine accomplishment. I think that the view I expressed was a strong optimism with the leadership directly charged with these programs at the present time.

I am happy, also, to say that I think we are making fine progress in most of the programs. Some of them, as to their principal difficulties, are behind us. We are producing Atlas missiles today and the Atlas missile is perhaps a little less complicated and considerably

less expensive than some aircraft that we try to produce. And we have the expectation that the Atlas will perform in a reliable fashion, although we have seen disappointments, or a disappointment recently after, I think, some 22 successive successes.

Mr. CHENOWETH. You feel that Dr. Glennan and Dr. York are fully competent and capable and qualified to do the work that has been assigned to them here, that is, leading NASA and Defense so far as space is concerned?

Secretary DOUGLAS. I am happy to give you my very sincere conviction that we are all, and the people of the United States are very fortunate to have them both in the posts they occupy.

Mr. CHENOWETH. And you feel that those men, by conferring with each other, and establishing proper contacts between their agencies, can do a cooperative job in this joint effort?

Secretary DOUGLAS. Indeed I do.

And I would like to go a little further than that and say that in the Defense Department, not only are we fortunate in having Dr. York and his staff but, at the present time, we have men of extraordinary capability and qualifications in the research and development posts in the services, Dr. Perkins, who has just come to the Air Force, and Dr. Wakeland in the Navy, Dr. Morse in the Army. They are extraordinarily well qualified. They are objective. They are men of high professional reputation, and they all work together with confidence in each other.

Mr. CHENOWETH. In other words, you have no reason to feel discouraged over the progress we are making in the space program?

Secretary DOUGLAS. I think we look better than we have ever looked.

Mr. CHENOWETH. Thank you.

That is all, Mr. Chairman.

The CHAIRMAN. Mr. Daddario?

Mr. DADDARIO. Dr. York, pursuing Mr. McCormack's questioning just one bit, you say that you find it convenient, on occasion, to call Mr. Horner or Dr. Glennan directly, and that this seems to be the simplest way or the quickest way to accomplish certain objectives; that going through the liaison committee has not necessarily proven to be the most expeditious way.

Yet, section 204 of the Space Act as it is now written says that the Administration and the Department of Defense shall advise and consult with each other on all matters within their respective jurisdictions through the liaison committee.

Since the Act says that, do you believe that the CMLC should have been sidetracked, that you do have the authority to go around it? Since you have gone around it, do you believe that it was given the proper opportunity to work?

Dr. YORK. As I said, I can't state that it was given a completely fair trial. I don't know what would constitute a completely fair trial of something like this. It certainly was efficient and in the interest of getting the program done expeditiously, a faster way to go, a faster way to deal with the people over there was directly. We didn't interpret this as meaning that it should be exclusive.

Mr. DADDARIO. Yet the law does not provide any alternatives, does it?

Dr. YORK. Well, when I called them up, I didn't have this section in mind. [Laughter.]

Mr. FULTON. May I be your counsel? Would you yield?

The CHAIRMAN. If the gentleman will speak up just a little bit, and the witness, too, I think you will be heard just a little better.

Mr. FULTON. Do you yield on that point?

Mr. DADDARIO. Yes.

Mr. FULTON. On the next to the last line of that 204 subparagraph (b), it says, "and shall keep each other fully and currently informed with respect to such activities."

So that there is some statutory authority of going directly as well as through the committee.

Mr. DADDARIO. Well, Mr. Fulton, if I may look at that from an attorney's eye, too, I think that that might be read as "shall advise and consult through the liaison committee, and shall keep each other fully and currently informed through the liaison committee."

That is how I read it and interpret it, and I don't think the CMLC has been given a fair chance.

The CHAIRMAN. Will the gentleman yield at that point? I would like to ask the Secretary and Dr. York a question.

If the case is that NASA and DOD have kept each other fully informed, why was no action taken on the CMLC's recommendations, as Mr. Holaday testified the other day? Why were such recommendations allowed to lapse over a long period of time, and nothing done about them?

Secretary DOUGLAS. Mr. Chairman, perhaps Dr. York will add something to what I have to say.

My understanding is that the only recommendation that Dr. Holaday referred to was one with respect to the management of ranges and tracking with a particular view to controlling the planning and provision of ground facilities.

He referred to a communication that I do not happen to have seen that I believe was prepared some 14 months ago, I think he said.

The CHAIRMAN. He also referred to a report that the law required him to give to the Defense Department.

Secretary DOUGLAS. I just might say that the fact that there has not been definitive action in creating a special group to accomplish range and overall tracking coordination, doesn't mean that the Defense Department has not been active with respect to that problem.

We had the problem particularly in connection with the support of the Mercury project; many different proposals were made as to where the responsibility should be for support of that project and so forth.

There were a variety of suggestions. We worked out what I think we all believe is a satisfactory solution with General Yates at the Atlantic Range, charged with responsibility and reporting through the Joint Chiefs of Staff on this project to the Secretary of Defense, to assure such service support as may involve Joint Chiefs' approval.

I just say that in line with the fact that this is a day-to-day problem for Defense Department, for Dr. York, and it has been receiving constant attention.

Perhaps Dr. York would like to add to that.

Dr. YORK. No; not on the specific question.

The CHAIRMAN. Mr. Daddario?

Mr. DADDARIO. Mr. Secretary, the only thing that bothers me about your approach to this is your apparent assumption that the Defense

Department can work closely with NASA, and the assumption there that there are no coordinating problems within the Department of Defense, itself, that everything there is hunky-dory, that the Air Force, the Army, and the Navy are getting along perfectly, that there are no problems.

Now, there are still coordinating problems in DOD that would have to be adjusted with those of NASA insofar as space is concerned; are there not?

Secretary DOUGLAS. Well, the services are getting along pretty well, would be my observation at the present time, with respect to the space programs. We are in quite different shape from what we were a year ago. Responsibilities have been assigned and are recognized, and the projects that are left in NASA at the present time, that are active development projects—in ARPA, excuse me—will be assigned to services in accordance with decisions already made.

There is no longer, I would like to assure all of you, the open-season situation that existed a couple of years ago and a year and a half ago, with the services stepping out and promoting a particular project, and proposing particular projects, outside of what has now become an orderly structure for military space activity.

Mr. DADDARIO. Well, what about Nike-Zeus? This problem is perhaps outside the space area. Yet I think it falls within this discussion. We have heard testimony very recently that the Army still believes that the Nike-Zeus program should proceed. They deplore the fact that $137 million which were appropriated last year for preproduction were not spent. They still feel this is a vital program which we should go ahead with, and there is certainly no agreement within the Department of Defense on this proposition.

Secretary DOUGLAS. My remarks went to space projects.

Mr. DADDARIO. Yes, I understand, but this illustrates the problem of coordination. There are other similar projects which I could go into, but I am concerned with Nike-Zeus, and this being an area of dispute, do you have the system to straighten it out, as well as other disputes?

Secretary DOUGLAS. Of course we have. It would be just as appropriate, I really think, for our discussion of space management, or very nearly as appropriate to refer to difference of views on a system like the B–70.

The Nike-Zeus, which is a major, important problem of the Defense Department, does not impinge seriously on our problem of Defense and NASA programs and coordination of programs with respect to space.

Dr. York, would you like to add any remark on that?

Mr. MCCORMACK. Would you yield on that?

Mr. DADDARIO. Yes.

Mr. MCCORMACK. Mr. Secretary, you overlook the fact that the select committee had as a primary purpose in creating this liaison committee, that the military importance of space activities would be recognized, and the military interest protected.

Secretary DOUGLAS. Well, I think that the select committee's concern was a proper concern, because I am perfectly clear that our first aim is to do those things in space which are necessary for our security. But I really think we have found that we could put substantially

effective priorities not only on our defense projects in space, but we have also been able to give top priority to NASA's project for peaceful purposes.

I indicated, perhaps too briefly, in my prepared statement, the Defense Department's first concern and the fact that the President's comment on the act gave assurance that the Defense Department had full authority and that the act would in no way derogate from it.

The CHAIRMAN. Any further questions, Mr. Daddario?

Mr. DADDARIO. Do I still have time?

The CHAIRMAN. Your time has expired. You yielded some time, however.

Mr. DADDARIO. I just have one further question. I would like you to tell me how, in this coordinating program that you propose, you are going to coordinate the NASA aerospace medicine programs with that of the Department of Defense.

Secretary DOUGLAS. The way I would expect that those programs would be coordinated would be with a special panel consisting of NASA and Department of Defense individuals, with a chairman from either NASA or the Defense Department, and that chairman would be a member of the Activities Coordinating Board.

Now, actually, within the last 2 weeks Dr. Glennan came over to the Defense Department, sat down with Secretary Gates and myself, and I think Dr. York was present, and discussed his problem and his program to create an office on aeromedicine in NASA, and we discussed at some length the importance of NASA's utilizing the skills and knowledge and know-how that had developed, particularly in the Air Force and the Navy, and not undertaking new studies or a great project that would duplicate what has been done.

I have, myself, confidence that the two projects can be so coordinated. I think there will be relatively few individuals devoting their time to it in NASA, and I am sure that the sources of knowledge and know-how will be utilized.

The CHAIRMAN. Mr. Miller?

Mr. MILLER. I have only a couple of questions to ask.

Mr. Secretary, I believe you said the armed services are getting along pretty well together. And of course this, to me, is part of the key; the Defense Department and NASA will be able to work together if within the Department of Defense we have harmony. Now, is that harmony brought about by virtue of the fact that you stripped the Army of practically any responsibility in this field? You took Jupiter away from them, a successful missile, and turned it over to the Air Force. You have gotten rid of such men as General Gavin, 2 years ago, and now General Medaris; they stepped out of this picture because of pressures.

Is this the price that we are paying for harmony within the Defense Department?

Secretary DOUGLAS. No. I would personally think that your phrase "have gotten rid of Gavin and Medaris" was wholly unjustified. I have a high regard for both of them, and I think they both made fine contributions to the Defense Department.

Mr. MILLER. I agree with you.

Secretary DOUGLAS. Now, as to the Army's present position in the space program, they have a recognized place and a responsibility which

is the top responsibility for the development of communication payloads, and this is an important part of our space program.

They also, of course, have extensive missile programs, guided missiles and ballistic missiles, with the largest one now being the Pershing. These are outside the space program, but they are in what we have seen was more or less a similar range of activity.

I would state the solutions have taken place in quite a different way. We have through experience and through accomplishing some of the developments been able to get down to an understandable relationship between the services, utilizing special skills and also giving effect to special interests. This is so with respect to communications of the Army, it is so with respect to so-called navigational satellite that the Navy will do the work on.

Now, we have done things in the past which have involved duplication. In most instances, although on hindsight sometimes we might wish that we had not engaged in duplication, at the time that we pursued that course the urgency of the particular programs and the satisfactory result was so great that it seemed to me that two approaches were well justified.

Mr. MILLER. I agree with you that hindsight can perceive that there were duplications, but the thing that disturbs some of us, Mr. Secretary, is the fact that men like General Gavin, like General Medaris, with the Von Braun team—they pioneered in this—there was nothing much before Jupiter, so if the duplication came, it came following what had been initiated by these men. To see the services of these men lost to the Government is a sore blow.

I just wondered whether this is the price we paid, just as in an earlier age the Army paid the price of getting rid of Billy Mitchell because he just happened not to fit into the pattern. Are we paying that price, again?

Secretary DOUGLAS. No, I would say we are not. I would like very much to ask Dr. York's comment, because some of this goes into a competition that might be attributed to me.

Mr. MILLER. I would like to ask Dr. York. He is my constituent. [Laughter.]

I want to say I have the greatest respect in the world for him. I am happy to see where he is——

Mr. FULTON. The gentleman's time has expired.

The CHAIRMAN. The gentleman's time has expired.

Mr. FULTON. That saves Dr. York.

The CHAIRMAN. Mr. Moeller.

Mr. MOELLER. Mr. Chairman, may I yield my time?

The CHAIRMAN. No. Under the rules you can't yield your time.

Mr. ANFUSO. Will you yield to me for a question?

The CHAIRMAN. Mr. Moeller just told me that he didn't want to use his time.

Mr. ANFUSO. Does Mr. Moeller have the floor? Will he yield to me for a question?

Mr. MOELLER. I will yield, if the Chairman permits.

The CHAIRMAN. I have recognized Mr. King now.

Mr. ANFUSO. Mr. Moeller had the floor.

All right, Mr. King, will you yield to me for a question?

Mr. KING. I will yield to my distinguished colleague.

The CHAIRMAN. For a question, a short one.

Mr. ANFUSO. You know, I am afraid to ask some of these questions, because I don't want to appear critical. We are all trying to do our duty, you understand that, and I am sure you gentlemen feel the same way.

Do you think, Mr. Secretary, that if we were at war you would still permit DOD and NASA to go their separate ways, without establishing an overall czar?

Secretary DOUGLAS. Well, my answer is that I would expect to think it was proper. I would also expect that perhaps relatively less resources would be available to the NASA program.

Mr. ANFUSO. You would function the same way if we were at war?

Secretary DOUGLAS. Yes, because the program isn't a military program and it would be merely a question of what resources you would like to make available for peaceful purposes.

Mr. ANFUSO. And both you and Dr. York are satisfied that the program is going along sufficiently well that the President, our Chief Executive, is sufficiently well informed as to the urgency of the space program so that we need not do anything further?

Secretary DOUGLAS. Yes, I answer that in the affirmative. I think I would like to say this with respect to the urgency that exists, both in the military department with respect to space and also in the NASA.

Mr. ANFUSO. And you are satisfied too, Dr. York?

Dr. YORK. We probably wouldn't be doing the NASA program if we were at war, but rather only the Defense program.

Mr. ANFUSO. My question is, you are satisfied that our Chief Executive is sufficiently well informed as to the space program, as to planning, that we are in a good position vis-a-vis the Russians?

Dr. YORK. He is informed about the space program through Dr. Glennan with regard to the program to exploit space as an end in itself for whatever purposes. He is informed through the Secretary of Defense with regard to how we are utilizing space for solving military problems.

Mr. ANFUSO. And you are satisfied that we are doing the best we can?

Dr. YORK. You can always do a little more, but——

Mr. ANFUSO. Thank you, Mr. King.

Secretary DOUGLAS. I just want to emphasize, if I could, the urgency that is behind both programs. In the military programs we have established for our space activities very high priority, several at the highest priority level that we know. And in NASA I think the urgency has been well recognized by the rapid increase in resources devoted to the NASA program, which I believe this year is in the neighborhood of $600 million; in 1961 it has been presented to the Congress in the neighborhood of $900 million, and just recently Saturn, which is the big booster that much of our exploratory work will be based on, has been granted the highest priority.

Mr. ANFUSO. I ask unanimous consent that the time I have used not be taken from Mr. King.

The CHAIRMAN. I will recognize Mr. King as of now.

Mr. ANFUSO. Thank you.

Mr. KING. Mr. Secretary, this matter of coordination of NASA with DOD perhaps has been discussed so much that it might seem

to be flogging a dead horse for me to ask more questions, but I am going to resurrect the dead horse, if I may, and ask some questions. I think that is the privilege of each member, to put the question in his own language.

I am still concerned about this. I am impressed with the fact that the officials of NASA and DOD are working together, they are dedicated Americans, and in general they are pulling in the same direction and trying to accomplish the same purpose. I understand that.

I still feel, however, that there are certain areas of inevitable conflict, regardless of the high spirit of dedication. I don't think that these conflicts can be avoided.

In the matter of coordinating your activities in joint projects; for example, your weather project, weather forecasting or meteorology, your tracking, and so on and so on, inevitably you will have large areas of overlap. As we move into the future I can see that we are going to be building up great programs, the navigation program, and I mentioned weather forecasting and communications, and so on, programs that are now in their infancy, but which, as we get into this matter, may constitute the basis for a great new industry, and both NASA and DOD have a basic interest in those programs.

For example, navigation: it starts out essentially as a military program, but certainly will have civilian applications as we get into it. And other programs that start out as civilian programs will have military applications.

Now, I feel that in those areas where you have an overlap and a basic conflict of interest, you have to have one authority that does more than just act as a clearinghouse for ideas. It seems to me that you need somebody who can make a decision.

In my practice of the law I have found out that there are some situations in which antagonists can get together, but there are other situations in which antagonists—we call them "litigants"—just absolutely cannot get together. Judges can try for a year to get the parties together as a result of a pretrial hearing, but they just don't get together because their conflict is too great.

So I ask again the question, and I know it has been asked many times this morning. Don't you feel that in those areas it will require a major cooperative effort? And don't you feel that you need an authority that is higher than that of the parties that are directly concerned with the project, itself?

Secretary DOUGLAS. Mr. King, I don't feel we need any formal authority other than the President. Now, as a practical matter, the President has scientific advisers who add to the advice that he gets from NASA and from the Defense Department.

We examine these problems with them as well as with each other. You referred to programs providing meteorological information. These can be important. This responsibility at the present time apparently will be undertaken by NASA. It has been the Defense Department judgment that NASA could proceed with it and we could get everything we need out of it. So again I say, we have had quite a lot of practical experience in recent months in trying to work out a structure that would produce results with a minimum of conflict and a minimum of duplication, and the progress that has been made encourages me to believe that we are outlining to you the right road to follow.

Now, perhaps you would like to have Dr. York make some further comment, because he has been the focal point in dealing with the allocation of particular responsibilities.

Mr. KING. Mr. Secretary, my time has about run out.

Secretary DOUGLAS. Right.

Mr. KING. But let me just give one other application of what I am saying. When General Medaris was here he said that in his opinion it was absolutely impossible, unless you had such an authority as I am talking about, to eliminate the duplication in R. and D. work. He said in effect, try as you will, if these two different agencies meet together, it is impossible, just by meeting together and talking this thing over, that that isn't enough to eliminate the duplication.

He indicated that over here you have one research laboratory that is carrying on its line of activity, and over here and in a different organization, the same type of activity, and it is inevitable that you have overlapping, unless you have one authority over them both, not just a coordinating agency where they can get together and talk, but someone who can actually make decisions and say: You do this and you do that.

Now, I ask the question. Do you think that under the type of organization you have described, that you can eliminate what General Medaris said was inevitable duplication of effort in R. and D. work?

Dr. YORK. We can do a better job of eliminating it this way than we could with the CMLC with the chairman as a third party. It is going to be impossible to eliminate all of it, and that is because the program is so big. You would come somewhat closer with regard to these small duplications if you actually had only one single program all together, I mean if——

Mr. KING. The CMLC, Dr. York, did not have actual authority to issue directives, as I understand it.

Dr. YORK. More than that, it didn't have authority, it couldn't possibly have the same kind of information as—a chairman of a liaison committee will never have the same kind of information with regard to what is needed and what can be done and what is going on as the actual program director would have.

Mr. KING. My question presupposes that such an organization would be established and given the authority actually to make decisions and issue directives.

Dr. YORK. It would have to go—it would have to be the organization that actually operated the program, and not a third small organization that is set between them.

The CHAIRMAN. The gentleman's time has expired.

Mr. Morris?

Mr. MORRIS. Mr. Chairman, a parliamentary inquiry? I would like to ask some questions that are not directly related to the Secretary's statement, but they are prompted by a sentence at the top of page 2, where he says, in effect, that investigation of space for peaceful purposes should not have to compete for defense dollars within the Defense Department or——

The CHAIRMAN. Go ahead and see what the Secretary has to say. If he doesn't mind the question—you have got 5 minutes in which to question him.

Mr. MORRIS. I think all programs compete with one another for money within and without the Defense Department. Military and domestic programs, all programs compete because of budget limitations. Now, if we didn't have any limit on the amount of money we could spend it would be a different situation. So with this in mind I would like to ask you a few questions.

Do you consider the ground-to-air missile, the Bomarc, a successful weapons system?

Secretary DOUGLAS. I couldn't describe it as a proven weapons system at this time. Bomarc "A" has enjoyed considerable success in testing. Bomarc "B" has run into serious difficulties in its early tests. But this, I would say, is not very different from our experience with other systems. We had a period of difficulty with Jupiter and Thor, we had a period of nearly, I guess 6 months' difficulty with Atlas, we had a very discouraging, although relative brief period in failures with Titan when we started to test Titan with the second stage.

So I don't think that any unusual significance should be put on Bomarc "B" testing difficulties at this time.

Mr. MORRIS. All right. Now, is it true that the Bomarc "A" has only been tested once out of 10 times successfully against a supersonic target?

Secretary DOUGLAS. I am sorry, perhaps Dr. York can answer that. I am aware of one successful test against a supersonic target. I don't know what the others have been.

Dr. YORK. I am not certain about the statistics, either, Mr. Morris.

Mr. MORRIS. Well, I believe that is what the Defense Department testified before the House——

Secretary DOUGLAS. I think that is probably correct, Mr. Morris' committee, but I am not certain.

Mr. MORRIS. ——Appropriations Committee, that it had been tested 1 time out of 10 successfully against a supersonic target.

Secretary DOUGLAS. That doesn't mean there were nine failures. It means there was only one test against a supersonic target, I think.

Mr. MORRIS. Well, you may be correct, but that wasn't the way I interpreted the testimony.

Secretary DOUGLAS. I will be glad to give you the information.

Mr. MORRIS. You may be right. You will find that in part 3, page 340-something.

The CHAIRMAN. The Secretary will supply the information.

(The information referred to is classified.)

Mr. MORRIS. As I understand it, there have been seven straight successive failures or unsuccessful tests, whichever word you prefer to use, of the Bomarc "B."

Dr. YORK. That is correct.

Secretary DOUGLAS. Was there one successful one?

Dr. YORK. I don't think there have been any.

Secretary DOUGLAS. Perhaps not fully successful, but there was a Bomarc "B" test I believe in which the propulsion systems operated satisfactorily.

Mr. MORRIS. Also, I understand through the fiscal year of 1960 there has been $2½ billion spent so far on the program?

Mr. ANFUSO. $2½ billion?

Mr. MORRIS. $2½ billion.

Secretary DOUGLAS. I hesitate to agree or state an exact figure, but it is a very large amount of money, Mr. Morris.

Mr. MORRIS. And also that through the fiscal year of 1963 there will be approximately $4 billion spent on this system, and that does not include the Sage electronic control system?

Secretary DOUGLAS. Well, I would have to check the figures and furnish the figures to you.

The CHAIRMAN. Let me suggest this——

Secretary DOUGLAS. It is a very large figure, again.

The CHAIRMAN. The gentleman has 1 more minute remaining.

The witnesses came up here to testify on the bill. I think they are prepared on that.

Mr. MORRIS. Yes, sir, Mr. Chairman. And I certainly didn't want to embarrass these gentlemen by these questions. As I stated before I started out on the questioning, the thing that prompted the question was this competition for money.

Secretary DOUGLAS. Right.

Mr. MORRIS. We are competing for money in all our programs. The gentleman from West Virginia has a program in which he is very interested that is a competitor for money; we are all interested in that program.

Mr. HECHLER. I haven't mentioned it today yet. [Laughter.]

Mr. MORRIS. That is what prompted the question.

Secretary DOUGLAS. This is certainly true to a very substantial degree.

Mr. MORRIS. It concerns a lot of us and certainly we don't have access to the information that you gentlemen have.

The CHAIRMAN. Mr. McDonough, do you have any questions?

Mr. MCDONOUGH. Yes; just one question.

I appreciate your statements, gentlemen. The effort this committee is making in writing legislation is to remove as much as possible all of the frustration and confusion that exists between civilian space exploration and Defense, with the ultimate objective of meeting the competition that we are facing from our common enemy.

I have discovered in these hearings that there is very little this committee can do to correct any error that may exist on the launching pad due to some human element. All we can do is provide the organizational structure to make possible the complete cooperation of Defense and NASA.

Now, in the bill before us, do you think that this legislation will provide that vehicle of complete cooperation? And if it does, can we be assured that the competitive spirit and the personalities involved, jealousies that crop up between Defense and NASA, will be eliminated with the ultimate objective of trying to defeat the Russians and get ahead of them?

Secretary DOUGLAS. Mr. McDonough, I don't believe that any structure or any statutory provision can ever assure fully satisfactory coordination. For coordination and cooperation we have to rely on people. Their activities toward a single purpose can depend to some extent on the organization with which they are provided, and it is my opinion that the proposed amendments to the bill that are before you will result in an organizational structure which gives as good assurance of coordination of programs as I could recommend myself.

Mr. McDonough. In other words, you have no recommendation for any correction of the bill now before us? You think the way it is written is all right?

Secretary Douglas. I think the bill is all right, and I have this feeling: Sometimes it is very helpful and sometimes essential to provide particular means of coordination or cooperation beyond the general expression of intention. But I also think it is frequently easy to create new difficulties if people charged with a responsibility are told in too great detail how to do something, rather than what to do.

I would like to mention, if I might, the history in the Defense Department—sir, excuse me, if this goes against your time——

Mr. McDonough. No, that is all right.

Secretary Douglas. What I had in mind mentioning was the history of the ballistic missile programs, which started out back in 1954 with a sense of urgency, and at that time a committee of distinguished physicists, mathematicians, was appointed to determine the feasibility.

Now, this committee was appointed by people in the Defense Department that were concerned about the threat and concerned to move forward.

After they established the feasibility of the programs an urgency was recognized which made us dissatisfied with working through ordinary channels in the Department of Air Force and in the Department of Defense, so a so-called Ballistic Missile Committee was created in the Air Force and it had certain scientific advisers, and a similar committee was organized in the Department of Defense.

This created a new way of doing business on these projects. It avoided proposals and programs going from office to office through all the offices that had an interest, and insisted that the offices that had an interest sit down in one group and pass on the proposals. And this system was very successful but it has been a flexible system.

Today, some of the projects no longer warrant this kind of treatment. The people who participate change from time to time as the particular interests change. I think the experience has been a very successful one.

Mr. McDonough. We passed on the feasibility of several of these things. They are up to the point of practical operation.

Secretary Douglas. That is right.

The Chairman. The gentleman's time has expired.

Secretary Douglas. That is right, and this is what we have been operating on with these committees, in channels that are quite different from ordinary channels, but in every instance we have had responsible people getting together to carry out the programs. And this is what I would like to see happen in this situation.

The Chairman. Mr. Secretary, before we adjourn, may I ask you two questions to tie down two points?

I notice in your statement you said the President emphasized the fact that the Defense Department has ample authority to conduct research and development work on space-related weapons systems, and because I was with him, I know that Dr. Glennan stated over the television that he expected NASA to have the research programs.

Now, that is a fundamental problem. And I gained the view from the President's message that he expected NASA to have the research programs.

Now, what about that? Should NASA have the research programs or not?

Secretary DOUGLAS. May I read, Mr. Chairman, from the President's message to the Congress with respect to the proposed amendments?

The CHAIRMAN. Yes.

Secretary DOUGLAS. On the second page, he states—

> The military utilization of space, and the research and development effort directed toward that end, are integral parts of the total defense program of the United States. Space projects in the Department of Defense are undertaken only to meet military requirements. The Department of Defense has ample authority outside the National Aeronautics and Space Act of 1958 to conduct research and development work on space-related weapons systems and to utilize space for defense purposes; and nothing in the act should derogate from that authority.

The CHAIRMAN. All right. That answers the question.

Now, let me ask you this question: Isn't every development in space of possible military interest? If the answer is yes—and I think it is yes—doesn't that give the military everything?

Secretary DOUGLAS. No, sir.

Dr. YORK. Everything that the National Science Foundation does, the Atomic Energy Commission does, the National Institutes of Health does, the Interstate Highway Commission does, have got potential defense implications.

The CHAIRMAN. Correct, correct.

Dr. YORK. But——

The CHAIRMAN. But you don't have the authority in law to take over in those matters. This gives you authority in law to take over any activity in space that has a defense implication.

Dr. YORK. If you stretch it far enough.

The CHAIRMAN. Well, that is true, if you stretch it far enough it would give you that authority.

Dr. YORK. But the record is we haven't stretched it that far.

The CHAIRMAN. No. But should we write a law giving you such authority or should we change this a little bit so that there will be some limitation? After all, when you send up a communications satellite, for example, that has military significance of the most positive type.

Similarly, with navigation, the same thing is true with practically every phase of this space work.

Secretary DOUGLAS. But it might be worthwhile for special purposes to create a limited communications system utilizing satellites at rather great cost when a serious look at using the same systems or modifications for commercial purposes would not seem justified at that time.

Now, there are projects of NASA to probe outer space, probes to the planets, Venus and Mars. I think that these are important, but I think that they are important today with respect to our overall technological capability and new scientific knowledge and not at all with a direct relationship to our military probes.

The CHAIRMAN. But, Mr. Secretary, it gives you a better booster, and the military can use a better booster.

Dr. YORK. It doesn't give us a better booster. These probes that are going on right now use the military boosters. It is the other way around.

The CHAIRMAN. That is correct. Therefore, you have jurisdiction under this language to do fundamental research, don't you?

Dr. YORK. We have not interpreted it that way.

The CHAIRMAN. Well, you are doing such research, though, with some of the boosters?

Dr. YORK. That is not——

Secretary DOUGLAS. No.

Dr. YORK. That is certainly not what either the President or Mr. Glennan have referred to when they have talked about research.

The CHAIRMAN. I am glad——

Dr. YORK. They have not been referring to booster development.

The CHAIRMAN. I am glad to hear it. But it seems to me the language ought to be changed if we are going to reach the result which you have in mind.

Mr. DADDARIO. Mr. Chairman, would the gentleman yield?

The CHAIRMAN. Mr. Fulton asked me first.

Mr. FULTON. I believe it is the old story of nonexclusive jurisdiction. Each side has jurisdiction in research and development, and I hope that each side will retain jurisdiction in basic research.

I wouldn't like to see the Department of Defense, or any of the services restricted to weapons systems through budgetary justification on a weapons system.

The CHAIRMAN. If the gentleman will yield.

Mr. FULTON. Just one more minute.

The CHAIRMAN. Let me follow through.

If that is true, then to get a decision as to who will exercise jurisdiction in any case, you will have to go to the President.

Mr. FULTON. I doubt that.

Dr. YORK. It has been easy to agree.

The CHAIRMAN. They haven't agreed.

Dr. YORK. Sure we have.

Mr. FULTON. May I suggest this?

We had the same thing in history on several previous occasions, one is NACA—it was a very fine history of the use of a Government agency, the National Advisory Committee for Aeronautics, for both civilian and military uses, from the period of 1950 on.

The CHAIRMAN. Will the gentleman yield?

Mr. FULTON. Likewise, we have had another history of ARPA, where I am sure Dr. York remembers what the negotiations were on the transfer of functions to NACA, and the insistence of some of us that this broad base of research and development program be kept in each, and that there be room in the budget for each.

May I finish with this?

You can't take it to an extreme because if you did you would then have the military making every plane in this country and every truck.

The CHAIRMAN. But the thing we have been worried about is overlapping jurisdiction, and indecision in taking over, and duplication, and that is what we are trying to avoid. I don't believe you are going to be able to do it if you concede beforehand that the military and NASA are going to have joint jurisdiction over the same program.

Mr. FULTON. The purpose of my asking you to yield was this, that I ask unanimous consent that Dr. York at this point in the record be permitted to answer the question of our good friend Mr. Miller when we were rather jokingly calling the time.

The CHAIRMAN. Mr. Miller has gone.

Mr. FULTON. I would like consent to put it in the record.

Dr. YORK. What was the question?

The CHAIRMAN. If there is no objection, you will answer the question.

I will recognize Mr. Daddario for a brief question.

Mr. DADDARIO. Following along on this line of coordination, I think it works both ways. The thing that bothers me especially in this aerospace medicine field that we touched on before is, you have given a statement here today that you have met with NASA, and you have cautioned them against duplication in this particular field.

And when they appeared before this committee, their position was that there was no duplication in this field of aerospace medicine, and that they needed a competence of their own.

It is my belief you have within the Air Force a particularly good area of responsibility that you should keep, and that NASA ought to handle their responsibilities in this area by giving you their requirements, and that you should then carry them out and give them the results. We should not be spending additional moneys for additional buildings, for additional salaries in this particular area.

Secretary DOUGLAS. I think that they are likely to delegate responsibility or to delegate activities in the field to a very large extent, but I agree with NASA that they have to have some competence in their own shop to plan requirements and to apply critical judgment to the work that is done for them. They have the responsibility at the present time of putting man in space.

Now, I think that when that is their primary responsibility, they can get the Defense Department actually to operate the launching system, the range, support, and recovery, but they still have a responsibility, and they cannot perform that responsibility unless they have competence within their own organization.

I would hope that it would be a relatively small group that provided that competence in the field you are talking about.

The CHAIRMAN. Thank you very much, Mr. Secretary, for a very fine statement and for answering our questions.

Dr. York, we are always happy to have you, sir.

The committee will adjourn until tomorrow morning at 10 o'clock.

(Whereupon, at 12:10 p.m., the committee adjourned, to reconvene at 10 a.m., Tuesday, March 15, 1960.)

TO AMEND THE NATIONAL AERONAUTICS AND SPACE ACT OF 1958

TUESDAY, MARCH 15, 1960

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND ASTRONAUTICS,
Washington, D.C.

The committee met at 10 a.m., Hon. Overton Brooks, chairman, presiding.

The CHAIRMAN. The committee will come to order.

This morning members of the committee will have the pleasure of hearing Vice Adm. John T. Hayward, USN.

We all know Admiral Hayward well. He has been with us before. He is always an excellent witness.

We need your help, Admiral, in considering the legislation before us.

I want to say this before we begin: Yesterday, members of the committee were coming in and going out so much that, frankly, it made it difficult to recognize the members in order of seniority. When members come in and leave, as they did yesterday, it is just impossible for me to keep up with the sequence. Therefore, I would appreciate it very much if the members would stay with us a little better today.

I would like to get started on time. We are just a few minutes late this morning. It seems to me that we only fool ourselves when we get started late; we just take that much longer in hearings.

Admiral, we are pleased to have you this morning. You have a short statement. Would you wish to take that statement up first, sir?

Admiral HAYWARD. Yes, sir, Mr. Chairman.

STATEMENT OF VICE ADM. JOHN T. HAYWARD, DEPUTY CHIEF OF NAVAL OPERATIONS (DEVELOPMENT)

Admiral HAYWARD. Having appeared before you this year on the subject of research and development in space, I welcome this opportunity to talk to you on the proposed changes to the National Space Act. As you are particularly concerned with the proposed changes, I will address my remarks to them. The authority of the Department of Defense to conduct a military space program is strengthened. This is accomplished in two ways. First, the somewhat confusing language of the present section 102(b) of the act, assigning the Department responsibility for military space applications, is eliminated. There is no need for this language for the Department of Defense derives its existing authority from statutes other than from the Space Act. The present language, thus, might be construed as a limitation. Secondly,

proposed paragraph 309(a) expressly provides that the Department of Defense is not precluded by anything in the act from developing space-related weapons and using space for defense purposes.

Section 201 of the act now imposes planning and supervisory duties on the President and creates a National Aeronautics and Space Council to advise him. These specific duties are repealed and the Council dissolved. Under proposed new subsections 309(b) and 309(d), however, the President retains two key responsibilities: Assigning development of new launch vehicles to either the National Aeronautics and Space Agency or the Department of Defense; and resolving disputes between the agencies.

Since these two responsibilities go to the heart of our space programs, the lessening of direct Presidential duties is more apparent than real. Dissolution of the Space Council will have the effect of making the President act based on the facts as presented by both agencies rather than by a designated space council. This is probably better, for it is rule by exception rather than in every program detail where there may be a disagreement.

The Civilian Military Liaison Committee, established by section 204 of the act, is eliminated. However, proposed new subsection 309(c) requires that the National Aeronautics and Space Agency and the Department of Defense advise, consult, and keep each other fully informed about each other's space activities. Elimination of the Civilian Military Liaison Committee, as such, is not important. There is no good reason why the specific means for exchanging this information between two Government agencies should be prescribed by statute. What is important is to accomplish this exchange throughout the program. I believe Deputy Secretary Douglas has described the proposed plan to accomplish this with the National Aeronautics and Space Agency.

The proposed section 309 "coordination and cooperation" might be improved if it were enlarged to require that—

(*a*) The National Aeronautics and Space Agency be responsive to military needs in aeronautics;

(*b*) The Department of Defense make available as practicable the military advancements having peaceful application; and

(*c*) The two agencies make maximum use of existing national facilities.

The committee is well acquainted with my previous testimony on this subject starting with the select committee. It was the decision of Congress to enact the present law and the recommendation of the Executive to modify it as now proposed to you. As long as the space program of the United States is suspected of falling short of the desired goals, we will have a continued demand for improvement of the space organization.

That completes my statement, Mr. Chairman.

The CHAIRMAN. Thank you very much, Admiral, for your short, forthright statement. I like the last sentence of your statement. I think you are correct when you say that as long as we continue to fall short of the desired goals, we should look for an improvement in the organization, and give it all the help that we can to reach our goals.

Admiral HAYWARD. Yes, sir, Mr. Chairman. As you know, I have testified on this since 1957, when the sputnik came in, and my feeling

is that this particular law, as it was written, section 102(a), assumes basically there are two programs, a military program and a peaceful program, and it says—

> The Congress hereby declares that it is the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all mankind.

And everything that has happened since then is based on this assumption that there is a peaceful program and there is a military program.

The CHAIRMAN. That is correct. There are two programs. You carry out your portion of the military program, and NASA has the peacetime program.

May I ask you this, Admiral: I know you to be a scholar and a most capable man in handling matters in connection with writing legislation; were you consulted, personally, on this bill prior to its recommendation to the Congress by NASA and by the Defense Department?

Admiral HAYWARD. No, sir, Mr. Chairman. They didn't discuss in any manner with me this proposed legislation. As you probably recall from my previous testimony, I had recommended one national space exploration program and the Atomic Energy Commission approach to the whole space program. This was before Mr. McCormack and the select committee back in 1958. I was not consulted in any way with this.

The CHAIRMAN. They didn't want that type of testimony, I suppose?

Admiral HAYWARD. No, sir.

The CHAIRMAN. To what extent was the Navy Department consulted? The Navy has a big stake in this program.

Admiral HAYWARD. Yes, sir, we have a big stake and we were not consulted either. I talked to Mr. Franke and he didn't know about the legislation until it had been sent forward to Congress. I learned about it from Dr. Glennon the day it was sent forward to Congress.

The CHAIRMAN. And that was the first that you knew of it, and the first the Navy knew of it, too?

Admiral HAYWARD. Yes, sir, that is correct.

The CHAIRMAN. Now, Admiral, in April 1958, when you appeared before the House select committee, you told us, and I am quoting your words now:

> I think the setup with the Atomic Energy Commission is a good one. The AEC is responsive to military requirements. We get in on all of the programs and we help them.

Now, do you still agree with that statement? Do you still think that stands good?

Admiral HAYWARD. Well, Mr. Chairman, the Atomic Energy Act was such that it permitted us to really review the program legally, the MLC, the chairman of the MLC. And I must point out that the Joint Committee in Congress has been tremendous help in this matter. Right today, in 1960, if you were to make one national space program, I would be inclined to put it in the Department of Defense, the same as General Medaris.

The CHAIRMAN. Now, at that time, 1958, you added that the AEC formula might well be applied to the space agency.

Admiral HAYWARD. Yes, sir.

The CHAIRMAN. Is that your view today?

Admiral HAYWARD. The formula could—it certainly could work in this matter, Mr. Chairman, but in order to do this, you would have to write the law as was proposed to Mr. McCormack. He permitted me to take the sections of 585 that I thought were applicable and put them in my recommendations, and that made the Administrator of the space agency refer the entire program to the Military Liaison Committee for approval and discussion.

Now, that is the difference between what happened in the original act and the CMLC. When you call it a Civilian Military Liaison Committee it was put down below the management efforts of both agencies, both the Department of Defense and the NASA, and so it was never employed.

The CHAIRMAN. Now, let me ask you: Do you think the space agency should have a Military Applications Division within it, and a Military Liaison Committee as well?

Admiral HAYWARD. Well, I feel, as I said in my statement, that the programwide information has to be exchanged. You can't let two programs just go without coordination. Whether this coordination has to be by statute or administration, you have to have it.

The CHAIRMAN. What better way——

Admiral HAYWARD. There is no better way.

The CHAIRMAN. Is there than to have a good, working, able legislative liaison committee?

Admiral HAYWARD. There is no better way, Mr. Chairman. It has worked for the Atomic Energy Commission. However, you must remember what the law said, the Military Liaison Committee and its Chairman review the entire program of the AEC, and they are party to all of the things in the Atomic Energy Commission, and with this type of legal authority they have been able to do their job.

The CHAIRMAN. Has that crippled the AEC in any way?

Admiral HAYWARD. No, sir.

The CHAIRMAN. Or retarded its activities?

Admiral HAYWARD. No, sir. And I am sure the Joint Committee could tell the committee in great detail how it has worked and worked well.

The CHAIRMAN. Under that type of arrangement, haven't we led the whole world in research and development of atomic energy?

Admiral HAYWARD. Yes, sir.

The CHAIRMAN. And doesn't the whole world admit that we have led in the development of atomic energy?

Admiral HAYWARD. Yes, sir. That is correct. Of course, the space business is a little more complex because it covers a great deal more technically than the Atomic Energy Act did. The Atomic Energy Act was primarily pointed to fissionable material, its uses, its employment in weapons, the uses of power, propulsion.

The CHAIRMAN. Is there any reason why the principle involved should be different?

Admiral HAYWARD. No; the principle is a good principle, Mr. Chairman. If it hadn't been a good principle it wouldn't have survived.

The CHAIRMAN. Now, and without reference at all to personalities—I, myself, think Mr. Holaday is a very capable man—so, I repeat, without reference to personalities—what is wrong with the Civilian

Military Liaison Committee? Why did it not function in your judgment?

Admiral HAYWARD. Well, Mr. Holaday is a very competent man, Mr. Chairman. Mr. Holaday was given an impossible job. The difficulty with the present CMLC was that it was completely bypassed by both agencies.

The CHAIRMAN. Of course, you know the President approved the charter of the CMLC which gave that committee authority?

Admiral HAYWARD. Yes, sir. It was implemented very poorly, very halfheartedly, really. As a matter of fact, they didn't want any to begin with. They didn't think it was necessary, if you read the record, the testimony in the select committee was that they didn't want a CMLC. This was a decision of Congress to put it in, and I think Mr. McCormack was quite influential in doing it, except it didn't come out as he started.

He started to put it in, I believe, in the same context that the MLC for the AEC was put in, where they had definite authority and responsibilities. It didn't turn out that way.

The CHAIRMAN. Well, can you offer any suggestions to this committee that would help to improve that organization, its efficiency, and its ability to perform its work? I can say this, the American people have gotten pretty much tired of some of these failures. If we do not get along with this program, and they find the Russian flag planted on the moon, for instance, they are not going to be happy about it, and they are going to insist upon what they think they should get.

Admiral HAYWARD. You are correct, Mr. Chairman. If it is all right with you I will review my testimony to show you how things have gone along because I read it all and wanted to actually see what had happened in the meantime. Now I have said that going back, the events of 1957 made it quite evident that the scientific approach of our international geophysical efforts would not yield equality with the Soviets in space achievements. In early 1958 we were considering the organization that should be established to direct the space effort of the United States. The influence of the Atomic Energy Act was quite strong due no doubt to the demonstrated effectiveness of that solution for achieving results in a highly technical field. Many similar measures were considered for inclusion in the Space Act for management of space.

I felt then that the new space agency to be created should be under civil direction but responsive to military needs. I even proposed a division of military application within the agency since I had become firmly convinced of the efficiency as such during my service with the AEC. Although this division was not provided for by the Space Act which was enacted in 1958, other provisions reminiscent of the atomic organization, such as the Civilian-Military Liaison Committee, were included.

Now by the spring of 1959 we had had a chance to live with the new organization created by the Space Act, although growing pains were yet in evidence. As I testified that year, eight new organizations had been created since Sputnik I and I recited 16 offices that were influencing space activities.

With the Advanced Research Projects Agency conducting space projects in the Department of Defense and NASA taking a firm hand

in space endeavors it appeared that a single national space program did not exist. Since such a single program was envisioned by the Space Act and I stated last year that I still favored such an approach, I expressed concern over the results of the numerous changes in policy and guidance. I feared that the needs of the Navy in space would not be satisfied if burgeoning levels of organizations continue to envelop us.

I also referred to my previous testimony in 1958 since I was still concerned that in a comprehensive program the new NASA might not be sufficiently responsive to the requirements of the military. The predominant attitude at that time, however, was that the new structure should be given a chance to prove itself before undertaking hasty changes. This was no doubt a proper opinion.

Now by this year the views are somewhat clearer because the play is still going on; I must admit the critics' reviews have not been rave notices, as you know, but the demand is still strong for a continued performance in this organization field. Changes have occurred, either quietly or with public clamor to solidify the impressions of a year ago. Within the Department of Defense changes are underway to place with the military services the responsibility for the development and management of space systems. ARPA has gotten out of the business and will continue to conduct advanced research. NASA has become clearly established as the agency conducting space exploration and therefore responsible for the huge rocket boosters that exceed the thrust required for military missiles.

The necessity for such organizations as the Space Council, I believe, has decreased as the various working organizations have taken hold of the space programs.

Now, there are some areas of worry that we have in the service. One of them is in aeronautical research. NASA still has the responsibility to do aeronautical research. Unfortunately, with the space business being in the forefront, aeronautical research has been going down the drain. The manned airplane is here to stay for a long time and every airplane in the world today that flies, including the Soviets', bear some stamp of an NACA research project on them. These planes are an outstanding example of the marvelous work that NACA did in the research business in aeronautics.

Now, on what has happened since 1958, the aeronautical research is going down the drain. There is practically nothing being done in air-breathing engines; the hydrodynamics facility at Langley Field which has to do with hydrofoils which can be used for ground-effect machines is not under use at all. It looks as if aeronautical research is going to suffer. And I feel that we will have continued difficulty with this sort of business.

The CHAIRMAN. Something this committee might look into.

Admiral HAYWARD. When I looked at the funds—if you look at the funds that went into aeronautical research in this country prior to the enactment of the Space Act, 1956, 1957, and then in 1958, 1959, and now in 1960, you will see how it is gradually going down the drain. I do not believe that we should give up our leadership in aeronautics, and particularly in the commercial transports, in our military planes, by degrading the effect of the aeronautical research of the old NACA. There are many people who feel real strongly on

this and we can see it happening to us. I have asked the Secretary of the Department of Defense if we are to take up the aeronautical research that NASA has dropped. You see, prior to the space business we used to review the research program with NACA, and our own, and we would determine what we would do after seeing their program.

The X–15 is one of these programs that has arisen out of the NACA work, and I feel that we have to make sure that this research activity continues as it should.

Now, we have also had trouble already, when you do not have anything that brings these two programs together and is reviewed programwise, you find that the Bureau of the Budget makes the decisions and no technical man. I have a good example in the 1961 program. I have put in for a hypersonic wind tunnel at the Naval Ordnance Laboratory for Dr. Kurzweg, probably one of the most outstanding air ballisticians in the world. He was one of Von Braun's cohorts. For 2 years I worked to get this hypersonic tunnel and I got it through all the Department of Defense. I got the NASA people to sit in and say it was satisfactory, but the Bureau of the Budget deleted this when the bill went up to the House and Senate this year on military construction, and it was deleted on the basis that we were duplicating NASA's functions. I tried to get Dr. Dryden and Dr. Glennan and to call the Bureau of the Budget and say it was not so.

Well we lost that facility and this is just one example of what happens when you have two programs of this kind going up without really programwide exchange.

The CHAIRMAN. How much was that?

Admiral HAYWARD. This was roughly $2,100,000.

This is one of the difficulties that faces us. I talked to Mr. Douglas and Dr. York and they told me how they planned to put Dr. York and Dr. Dryden as cochairmen of this group of panels. I hope that this committee will have management responsibility, will review the program, and when we go forward with something that the Bureau of the Budget will accept their statements on it.

The CHAIRMAN. Thank you, Admiral. I am glad you extended your remarks, especially since your original statement was so short.

Mr. Fulton?

Mr. FULTON. Are we under the 5-minute rule?

The CHAIRMAN. We are under the 5-minute rule. I might say, however, that the admiral extended his remarks there. I am glad he did it.

Mr. Fulton.

Mr. FULTON. I am glad to have you here, Admiral.

Admiral HAYWARD. Glad to be here, Mr. Fulton.

Mr. FULTON. The problem comes up of having room for basic research in both the armed services as well as in NASA for the peacetime uses of space. The question is how much we should be spending on basic research. I understand that about 5 percent of our total research funds go into basic research. Do you think that is enough?

Admiral HAYWARD. No, sir, I have always gone on the basis of 10 percent, Mr. Fulton. We have been a little higher than the other services. Actually in the Office of Naval Research in the 1961 budget I have $114 million and it is closer to 10 percent total.

Mr. FULTON. But I am quoting the average.

Admiral HAYWARD. Yes, the average is five.

Mr. FULTON. The reason I am asking you is that I felt you were putting more effort into it. I am really asking you: Is the average high enough? When you are above it and the average is only 5 percent of the total funds?

Admiral HAYWARD. No, sir, 5 percent is not enough, Mr. Fulton.

Mr. FULTON. How should this committee go about emphasizing basic research? How can we advance and broaden the base of it, looking ahead to future years? That is really where this committee can do a good job of projecting into the future, as the Science and Astronautics Committee.

Admiral HAYWARD. Mr. Fulton, there are roughly three big agencies that are in this business: The National Science Foundation, of course, NASA, and the Department of Defense, and then you have the Atomic Energy Commission. I think it would be important, I do not know whether the committee has ever reviewed the basic research that goes on in those four agencies. You will find that it is very diverse and that there is a considerable amount of it going on. However, the tendency and all of the thinking is that we do not put enough effort in this field. It has been built up, the National Science Foundation and the Atomic Energy Commission and ourselves are trying to build it up, but if we had 10 percent of the total money, it would be better than 5 percent.

Mr. FULTON. Could you make two comments: First, why is the Atomic Energy Commission, and I believe both you and I favored that type of organization originally when we were considering setting up a space agency for the country, not in the Department of Defense now? And secondly, why is the DOD Liaison Committee to the Atomic Energy Commission satisfactory, while the Civilian-Military Liaison Committee to NASA is unsatisfactory and should be abolished?

Admiral HAYWARD. Well, it goes to the law, itself. The MLC under the basic Atomic Energy Act has very definite responsibilities programwise to the whole atomic energy business. For instance, the actual production loading of our reactors, how much plutonium you will produce, versus tritium, versus uranium, is a function of the MLC and it is spelled out by law. And this is the difference. In this law the CMLC if you read what their job was——

Mr. FULTON. We know what it is. But the question is, Should we now change the NASA–DOD relationship for an Atomic Energy Commission type of liaison committee in order to strengthen it? Whether they intended it or not, the liaison route through the CMLC has certainly dried up like a stream in the summer. There was only one item of particular importance that went through that route and everything else went through directly.

Admiral HAYWARD. Mr. Fulton, as I reviewed what went on in the last 2 years, if I were asked what I would do about that difficulty, my feeling would be that it should be an MLC and it should have the legal authority to review the entire program of NASA. It could be a military liaison committee and it could have a civilian chairman, but it would have to have the legal authority to review the program of NASA.

Mr. FULTON. Then let me ask you this: We had the NACA, the National Advisory Committee for Aeronautics ever since 1915, and that worked out very well for aeronautics. Why would your recommendation not apply equally to that previous situation that has worked out so well? We did not have it then.

Admiral HAYWARD. But the NACA, Mr. Fulton, you must remember that the Administrator of the NACA had to report to that National Advisory Committee of 17 people. That Committee, included all of the scientists, including people like Doolittle and Hunsaker, and they reviewed the program, and on that Committee were the military, both Air Force——

Mr. FULTON. Then why do we not continue the Space Council, if that is the case?

Admiral HAYWARD. But the President did not sit on the NACA.

Mr. FULTON. No. Well then, why do we not bring the Space Council down from the presidential level, and set it up in a way that worked so well with NACA through these many years, and then make it conform more to the Atomic Energy Commission, which some of us wanted to do in the first place?

Admiral HAYWARD. Yes, sir. This would work. Dr. Hunsaker, as you remember 2 years ago, said you could keep the present NACA organization, call it NASA, you could have your civilian committee and military on that and have the Administrator of the Space Agency report to that committee just like they did from 1915 until 1958. That would work. But with this original Act we did away with that and you put the Space Council with the President as the Chairman, which was too high.

The CHAIRMAN. The gentleman's time has expired. Mr. Anfuso.

Mr. ANFUSO. Admiral, glad to see you again, sir.

Admiral HAYWARD. Glad to see you, Mr. Anfuso.

Mr. ANFUSO. Admiral, have you any idea of what the Russians are spending on basic research?

Admiral HAYWARD. Well, it is pretty hard to say dollarwise, because which dollar are you going to use and which ruble do you use? The effort is tremendous. I would say at least 15 percent of the effort that they devote to their military programs is basic research, which is higher than ours.

Mr. ANFUSO. I have heard figures somewhere between 15 and 30 percent of the overall.

Admiral HAYWARD. Well in some fields they are higher, but normally it is about 15 percent.

Mr. ANFUSO. Fifteen percent, which is three times as high as our own.

Admiral HAYWARD. It is very high, yes, sir.

Mr. ANFUSO. Are we basing our research and whatever else we are doing in this space program merely on an effort to catch up with the Russians, or are we doing something new? Are we exploring something new? Do we have any funds to explore something new?

Admiral HAYWARD. Oh, yes, sir. We are doing a lot of basic research that is completely divorced from the Russian effort that is done in different fields than that they have published. But our effort is very diverse and is a very excellent effort. As a matter of fact, in the research and what we have done scientifically I think we

are ahead of the Russians. They still remain very much ahead of us in the rocket business, but I feel that some of the scientific accomplishments like Van Allen's and some of the other people have been tremendous.

Mr. ANFUSO. And some of these things will give us a "first"?

Admiral HAYWARD. Yes, sir.

Mr. ANFUSO. In the future, which will be just as spectacular as the first hitting of the moon by the Russians, do you think that is possible?

Admiral HAYWARD. Yes. You know it is a little odd that they are so far ahead of us in space but the radiation belt is called the Van Allen Belt even by the Russians, and yet they have been in the business, supposedly, and had been so far ahead. But technically, I do not feel that we are behind the Russians, except in that one field.

Mr. ANFUSO. And do you think that you are getting enough money to carry on this basic research at all of these research centers that we have, or do you think it should be doubled?

Admiral HAYWARD. Mr. Anfuso, if I ever said I had enough money, I would be fired.

[Laughter.]

Admiral HAYWARD. I do not have enough money, no, I do not. I have had to accept the decision. We have done as much as we can in putting additional money into basic research. I am more interested in that than in wasting our money on a lot of hardware that never get to be systems.

Mr. ANFUSO. Of course, Admiral, we have thrown millions of dollars down the drain on things that we have developed, and then found them to be useless and discarded them. Had we continued our basic research and spent more money on that, perhaps we would not have gone into production on many of these things, is that true?

Admiral HAYWARD. That is correct. As you read my testimony probably in the House appropriations, we spent up to $27 billion on continental defense, and that is a lot of money.

Mr. ANFUSO. Now, Admiral, there is a section of the bill now before this committee which I would like to get your views on.

A great number of the members of this committee, I might say a majority of the members, feel that there are bound to be disputes between the Defense Department and NASA and that this Committee which they propose to create between themselves will not be the answer because each representative of that Committee will follow, naturally, his boss. If he is representing, for instance, Dr. York, he will follow Dr. York; and Dr. Horner will follow Dr. Glennan.

Now, we are seriously thinking of having some overall person, we are not particularly concerned as to what we will call this person, we do not care whether you call him a czar or something else, but we want some person who is highly regarded, highly competent, who will have his own scientists to advise him, who will keep a constant watch on what Defense is doing and what NASA is doing. When problems are presented he can safely say to the President: Well, I think we ought to go ahead with a joint project here, or we ought to recommend what NASA is doing on this subject and not what Defense is doing, or vice versa. In other words, surely the country would benefit by such overall authority; that is, the ability to make decisions, which seems to be lacking at present. The proposal we are now considering

will only call for more conferences, and result in more disputes. Of course, both parties have the right to go to the President, but we know what the President will do because he is not familiar with this problem. He may decide with the Secretary of Defense or with Dr. Glennan depending on what the Bureau of the Budget might say, who knows.

The CHAIRMAN. The gentleman's time has expired.

Mr. ANFUSO. Let's have an answer.

The CHAIRMAN. Yes.

Admiral HAYWARD. You said he would have the power of decision. Unless he has the funds, he would not have the power of decision, Mr. Anfuso, it will just go to another committee.

Mr. ANFUSO. Granting that he has the funds, would you recommend such a position?

Admiral HAYWARD. Well, as my answer to Mr. Fulton, you could make it work this way, yes, very well.

Mr. ANFUSO. Thank you.

The CHAIRMAN. Mr. Van Pelt?

Mr. VAN PELT. Admiral Hayward, you made the statement that if you had a choice, these might not be your exact words, that you would place the entire program under the military. We have heard from a number of witnesses that perhaps there have been to many chiefs in this field, and that we haven't been able to continue on this program or that program long enough to phase it out.

The question which comes to my mind is, Why eliminate the CMLC and set up another committee for liaison?

Admiral HAYWARD. Mr. Van Pelt, as I said previously, this whole act is based on the assumption that there are two programs, a peaceful one and a military one. In my statement I wouldn't say give it all to the military now. I say that in referring to my previous testimony before the select committee, if I had to do it now and if I testified now on this subject I would say that if you were going to have one program, and it is based on if you are going to have one program, then it should all be in the Department of Defense. But as it stands now, the existing law and nothing in the proposed legislation changes the fact that there is a peaceful program and a military program. And I define it by saying there is a national exploration space program, and that exploration space program is what is conducted by NASA, and we in the military use space to do our job better.

Mr. VAN PELT. Well, we have also had testimony that there is a continuous liaison between the individuals in authority at the various levels between the Defense Department and NASA. Do you agree or disagree with that?

Admiral HAYWARD. Oh, no, this is true, Mr. Van Pelt. We couldn't do our work if I couldn't call—like I called Dr. Dryden to call the Bureau of the Budget about my wind tunnel. Certainly I wouldn't hesitate to call him.

He calls our people and comes over and gets all kinds of assistance. This goes back and forth. But the real difficulty, this day-to-day liaison this way, isn't the thing that Mr. Fulton was pointing up, which was the programwide review of both agencies which used to happen under the NACA. That does not happen anywhere now.

Mr. VAN PELT. Well then, CMLC never did come up with any ideas or review any programs, did they?

Admiral HAYWARD. Not to my knowledge, no, sir.

Mr. VAN PELT. That is all, Mr. Chairman.

The CHAIRMAN. That is an extremely important statement you made there, that the CMLC just didn't function.

Mr. Sisk?

Mr. SISK. Admiral, you made the statement a little while ago with reference to the CMLC and what went on at the time the initial act was written. You said they didn't want a CMLC. By "they," who were you referring to?

Admiral HAYWARD. Mr. McElroy and Mr. Quarles at the time, Mr. Sisk.

Mr. SISK. In other words, the Department of Defense did not want a CMLC?

Admiral HAYWARD. No sir, and I am sure that they must have consulted with Dr. Glennan on it.

Mr. SISK. I was a member of the select committee, and as I recall the testimony, it seems to me that there was general agreement on the part of those interested in setting up NASA, or our so-called Space Agency, that there should be some type of liaison committee.

Now, I recall that there was a long discussion over the authority of this group. Do I understand that you feel that the lack of support by the military has been the thing that has caused it to fail, or has it been lack of support by NASA that has caused it to fail?

Admiral HAYWARD. It is a little bit on both sides. Both agencies didn't implement the law, really. Having gone through that period, I remember that they didn't want to implement it at all. The charter—we had a great deal of difficulty writing the charter and everything.

Mr. Quarles was opposed to it.

The CHAIRMAN. Will the gentleman yield? Did you say they did not want to implement the law?

Admiral HAYWARD. Not at that time, no, sir, particularly on the CMLC, we had a great deal of difficulty with it, Mr. Chairman. There was no question in our minds that there was no enthusiasm for it. Even before the CMLC got into being, arbitrary decisions were made between the Administrator and the Deputy Secretary of Defense that we have had to live with in the space business. Nobody ever got to say anything about it.

Mr. SISK. Well, Admiral, I have been much impressed with some of your statements here this morning, as I have been from time to time when you have been before our committee on previous occasions. Frankly, I am coming to have some grave doubts about the organization of our space program. I was a supporter of establishing an agency to attempt peaceful exploration of space. But if changes are needed, I think right now is the time. If we have got to go back down the hill and start over again, the longer we delay it, the longer we may be delaying our progress in space.

I respect the opinions of the men like yourself and General Medaris, and Dr. Pickering—he takes a little different slant, but generally agreeing with the idea of making a single agency—maybe we are simply going to have to back up and make another run at this deal.

Now, do you feel that we will ever move ahead as rapidly as we should in this field, conserve the dollars, and yet do the job as long as we have two programs, a military program and a so-called civilian

or peaceful program? Is there any way that we can have a complete programwide review?

Admiral HAYWARD. Yes, you could have a programwide review, Mr. Sisk. Like Mr. Fulton said, the old NACA had it for years, from 1915 on, where the Administrator reported to the NACA. The NACA had both Department of Defense and military members on it, they went over the program, they approved it or disapproved it. So then when we came to Congress and the Bureau of the Budget, there was complete agreement. That is missing in this legislation. What they did was put the Space Council up with the President as the Chairman.

Well, you can do it this way. Of course, I shudder at reorganization again.

Mr. SISK. I agree with you. But if we aren't doing the job now, then is it going to help us any if we wait 2 more years and find out we are so bogged down that we must do it then? I think we had better do what reorganizing we must right now. It seems very important to me.

Many of us opposed setting up of the Space Council in the manner in which it was set up, and we voiced our opinions to that effect. I remember my good friend, Congressman Jerry Ford of Michigan and I discussed this at some length, and felt at the time that this would never succeed as it was proposed. But of course, Mr. Harlow and others came here, representing the administration, saying that is what they wanted.

We gave them a chance, and now it hasn't worked. Now, there are certain recommended changes, and I think we are going to have to have, of necessity, some reorganization. It seems to me maybe we should go back to the old NACA idea. This would cause the Administrator of NASA to report to a committee, and have his program reviewed, as you indicated was the case in NACA. What has been done is the CMLC has been downgraded to the point where it is actually a nonentity.

What would you say about that?

Admiral HAYWARD. This is a good suggestion. But would you take one of mine? If you did this, would you reorganize Congress also a little bit?

Mr. SISK. Yes, I am asking for your suggestions. I have great confidence in you.

Admiral HAYWARD. I would make a joint committee. I feel so strongly that the Joint Committee on Atomic Energy has been the strongest committee in Congress, has been one of the best ones, and if Congress is really concerned on this matter, and we are going to reorganize, why, let's do both of them.

The CHAIRMAN. The gentleman's time has expired.

Mr. SISK. May I conclude by saying I appreciate your ideas. This is what I want to get. Your views may be contrary to the views of some people, but I am glad to have them. I think we should face the fact that we are confronted with some real problems here. Let's try to correct them now, rather than try to go along with something that is not too good.

The CHAIRMAN. Would you elaborate, without taking time from anybody, on your recommendation for a military—what was it?

Admiral HAYWARD. Liaison committee.

The CHAIRMAN. Not liaison committee, no. Military applications division.

Admiral HAYWARD. Well, if you put this program, as Pickering says, all civilian, Medaris says all military, let's take the civilian. If you put it all in the civilian side, then you have a division of military applications, as the AEC, with a flag officer or general officer in charge of it, and he is responsible for the military applications of space in the agency. He is also party to whatever military liaison committee you have. He furnishes the support and gets support from the various agencies in the Department of Defense for his projects.

He actually tells the Department of Defense, then, what in the program that the space people have done that his people feel, have military applications.

Now, actually, this is the way it works in the atom today. They will blow a bomb up out West—at least they used to, they don't any longer—nevertheless, they would blow one up, come back and say: "Mr. Department of Defense, we feel we can make an atomic weapon that weighs 100 pounds and gives you 50 kilotons and it would do this and that. Would you like it?"

So they would come over to us and the three services sit down and we would write a requirement. This requirement would be written to take in the Army's needs, the Navy's needs, the Air Force's needs, and we go with this requirement to the Military Liaison Committee and they agree with it or say "Re-do it."

When they approve it, it goes back to the Atomic Energy Commission and to the Division of Military Applications. This is the manner in which requirements get into that particular organization. In the Space Division of Military Applications you would get the military applications of space programs fed into the Department of Defense to meet any of their requirements. This would work in a similar manner.

Now, if you had it over on the military side, you would have to have a civilian division of applications, the peaceful side. I mean, these are the two programs.

The CHAIRMAN. Mr. Bass?

Mr. BASS. Admiral, getting back to H.R. 9675——

Admiral HAYWARD. Yes, sir.

Mr. BASS. Which is before the committee; I gather from your prepared statement that you favor the changes outlined in H.R. 9675 if we retain the present framework of the Space Act?

Admiral HAYWARD. Yes, sir; that is correct.

Mr. BASS. But you have told us, as I understand it, that you—and correct me if I am wrong—that you do not approve of the present approach; that is, two programs, one peaceful and one military, which is the basic framework of the present Space Act?

Admiral HAYWARD. That is essentially correct, Mr. Bass. All of my testimony was along that line. I thought we should have one master space exploration program, and that this should go on under one agency. But as I said in my statement, it was a decision of the Congress to go this way, and the executive decided it needed changing, and I have to abide by the decisions.

Mr. BASS. Carrying this one step further, are you recommending to this committee that we now reorganize the whole system?

Admiral HAYWARD. Mr. Bass; no, sir. [Laughter.]

In going through reorganization, more sins are done in the name of reorganization than anything. Unlike General Taylor, when I retire I think I will write a book about that, instead of the military. [Laughter.]

But I wouldn't recommend that; no sir, I think you will delay things.

Mr. BASS. So that looking at the situation now from a practical standpoint, you would recommend to this committee that we adopt the provisions of H.R. 9675 with a few additional suggestions that you have here outlined on page 2 of your prepared statement?

Admiral HAYWARD. Yes, sir. I would like very much to hear that they have a basic responsibility on aeronautical research and there is a responsibility on the use of all facilities, things of this kind. And I feel that with that enlargement, we should go on with it.

Mr. BASS. Now, Admiral, some time ago—I have forgotten whether it was you or Congressman Fulton—mentioned a 5 percent figure that we are now employing in research, basic research. Five percent of what? What were you thinking about?

Admiral HAYWARD. Actually, my figure was of the total research and development budget of the U.S. Navy. It roughly runs about 5 percent. This will vary. In certain fields, you get more. I think Mr. Fulton was referring to the overall—this included the AEC and everybody.

Mr. FULTON. Right; the country's budget.

Mr. BASS. Well, if you take the overall military budget, we are spending some 15 percent, aren't we, on research and development, or better?

Admiral HAYWARD. Well, he said basic research, Mr. Bass. Basic research is really undirected research. You don't know what is going to come out of it, and it is completely different from the development side. The development is the big money. The basic research is the small money, really. We have roughly 2,100 contracts with universities and nonprofit organizations on basic research projects, everything such as monomers work, work on the propagation of electromagnetic waves, theory of the formation of the elements and the stars, these contracts run anywhere from $25,000 to $50,000 maximum in basic research.

Mr. BASS. And you add that all up and that is about 5 percent of the total naval budget?

Admiral HAYWARD. Yes, sir. This is what we try to keep in the R. and D., roughly 5 percent. My Naval Research and Advisory Committee president, Dr. Suits, has recommended that it be 10 percent, total, and this is what we are trying to do. We hope to have 10 percent in the 1961 budget. They felt that we made a pretty good study of the value of basic research to the Navy and it has become quite a textbook. Now very many people use it. It has shown over the years where basic research has paid off tremendously to us and to the other services. We have done a lot of work that has stemmed from basic research such as the solid propellants, polymers and molymers, things of this kind that we never would have been able to get.

Look at the liquid hydrogen business; in 1952 when I had the job of helping put together the first hydrogen bomb, we had a terrible time where liquid hydrogen existed in two states, ortho and para, it always was going from ortho to para. It gives off heat and you have to have another helium system to keep this liquid. Now we can make all of our liquid hydrogen in the para state. It would have been a lot easier. This is basic research. These are the sort of things when you start out you do not know whether they are going to have any application. This is what Mr. Fulton is referring to percentage-wise.

Mr. FULTON. I can give you a comment on the figures if you like. The Government this year is spending $494 million on basic research, and of the total basic research in the country the Federal Government is spending about one-seventh of the total. So that the total of the basic research is very large. As a matter of fact, though, the Government is paying for almost 50 percent of the total basic research in this country, 30 percent of which is done in Government laboratories.

Mr. BASS. Thank you, Admiral.

The CHAIRMAN. Mr. Wolf?

Mr. WOLF. Thank you.

Admiral, you might be interested in a letter I received this morning from a good constituent of mine. He says if we get everybody, the military and civilians, out of this and let the Navy handle it we would soon solve the problem.

Admiral HAYWARD. I agree.

Mr. WOLF. I am not saying, I fully agree with him.

The CHAIRMAN. He is a wise man, Admiral.

Admiral HAYWARD. Wise man; yes, sir.

Mr. WOLF. Then he develops his reasons and refers to the Polaris submarine as a deterrent weapon, and I thought he made a very plausible argument. Admiral, I am curious: What do you think is the real reason why we divided up into two agencies, the so-called military and peaceful?

Admiral HAYWARD. Well, I believe maybe Mr. McCormack could answer it, the chairman of the select committee, when he said "The Congress hereby declares it the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all mankind." And I do not know what the basis of this was, because everybody in the technical fields knew there were tremendous military applications. This was hidden under the rug, I guess.

Mr. WOLF. The question is: Is it a possibility there was merely a kind of propaganda front to cover up the sins of the past so to speak and give us a new approach so we could have an excuse to blame our failures of the past?

Admiral HAYWARD. It could be, because our effort in the IGY, the Vanguard project, was unclassified and was completely available to everybody, including the Russians, and it just followed that, I guess, Congress thought that was a good policy.

Mr. WOLF. Couldn't we have accomplished the same purpose by a strong statement by the military, a strong statement by Congress, and a strong statement by the President that we wanted to develop space on a peaceful basis, without going through this maneuvering?

Admiral HAYWARD. I do not know, because—remembering back now, when we were first doing Vanguard—there was a lot of concern by a lot of people that if we were the first one to put this thing in orbit over the Russians, they would take exception to it and insist it was a military program and that we were spying on them. There was considerable discussion in this town at that time as to just what our rights were in it and so we made quite a statement in the IGY of our peaceful intent. That is why we showed them everything then in Vanguard. I do not think that this does any harm, but this law is based on the fact that there are two programs.

Mr. WOLF. As you visualize this new program, assuming that this bill is approved, who really will be the boss then? Not the President; I mean, who is really going to make the decision, we know the President is not going to; in effect he is, but he is going to take advice.

Admiral HAYWARD. As I said in my statement, the Secretary of Defense and the Administrator would have to express any differences to the President. Now it is funny, there are any number of Government agencies in this town, where the lowest man who can settle any dispute between them is the President, nobody else. For instance, if the Department of Defense and the Department of Commerce have an argument, Congress does not settle it, the President settles it. We deal with the fish and wildlife people in oceanography, the Department of Commerce; if the two heads of the Departments cannot get together and cannot agree—we are having a first-class argument with the Department of Interior about the location of a reactor on Point Loma—now if we cannot agree, the only man in this city that can settle it is the President.

Mr. WOLF. As you visualize the mechanics then, the two heads of these Departments go to the President, they sit down with him, and have a cup of coffee together and talk this thing over; is that the way you see it?

Admiral HAYWARD. That is the way, in the big decisions. Of course, day-to-day disagreements would be settled by Dr. York and Dr. Horner or Dryden, whoever is on that panel, in that setup.

Dr. York can settle it from the research and development point of view. Dryden can settle it from the Administrator's point of view. Dr. York cannot settle it from the Joint Chiefs point of view. If Dr. York agrees with Dryden to do something and it involves a unified commander or some forces by the Joint Chiefs, Dr. York cannot settle it.

The CHAIRMAN. Mr. Riehlman?

Mr. RIEHLMAN. Admiral, we always enjoy your frank and forthright statements before this committee. Following up what my colleague Mr. Wolf has been discussing with you, if this has worked in other departments where, when a decision finally has to be made, it rests with the President to make the final decision, do you feel that that will not work in respect to this program that we have outlined in the revision of this bill, where the responsibility rests with Dr. Glennan and the Secretary of Defense and if they do have an argument and disagreement that cannot be settled properly by bringing it to the attention of the President?

Admiral HAYWARD. Oh, certainly.

Mr. RIEHLMAN. As you have said, through Dr. York or Dr. Horner?

Admiral HAYWARD. No, sir; it can be settled, no question about it. No matter who you set up in the space up above Dr. Glennan and Mr. Gates and if Mr. Gates does not like the decision this man makes, he still can go to the President, you see. The final decision, if there is a real fundamental disagreement, goes to the President, and it will be settled. But it will work.

Mr. RIEHLMAN. Let me ask you this, Admiral: We have had plenty of information that apparently this civilian committee just did not function effectively. Can you give us any reasons as to why you felt it did not?

Admiral HAYWARD. Yes, sir. Mr. Holaday had an impossible task. Decisions were made and they did not refer them to him. It was allowed to die on the vine.

Mr. RIEHLMAN. You mean decisions by the Secretary and the Administrator; am I correct in that?

Admiral HAYWARD. Yes, sir. They were made ahead of time, and without the CMLC at all.

Mr. RIEHLMAN. Do you feel that we can have a CMLC that will function properly without giving them some authority?

Admiral HAYWARD. You could have them function correctly if you will do as the old NACA did. The NACA had a committee, Mr. Fulton pointed out, and the Administrator reported to that committee and that consisted of your top people in the country in aeronautics, Jimmy Doolittle, all of those people, and the military. And the Committee reviewed NACA's program. Now, this is where that worked well. For 43 years it worked. When you passed this law, you took the NACA out of business. The NACA was primarily a research outfit. You put them in the hardware business and you took away the means in which they had operated and coordinated with the Department of Defense previously. And I think that answers what happened. But you can make it work that way very well.

Mr. FULTON. Would you yield?

Mr. RIEHLMAN. Just a minute. Mr. Bass?

Mr. BASS. I want to refer to the suggestion Mr. Anfuso made to you some time ago, namely, that of imposing another layer, a superczar or whatever you want to call it, to settle these problems. As I understand your testimony, you would not be in favor of that at the present time, at this stage of the proceedings?

Admiral HAYWARD. Let me say if you impose this man up there, he has to have the funding responsibility. He has to have the money, either that or review both programs which NACA did.

Now when NACA reviewed the programs and settled on the budget for the NACA, the military right away—of course we did not do what they did—went back and told them what we were going to do.

Mr. BASS. Do you favor that now, Admiral?

Admiral HAYWARD. That would work; yes, sir.

Mr. RIEHLMAN. NACA had the final decision.

Admiral HAYWARD. NACA had the final decision.

Mr. BASS. That is right. But the Civilian-Military Liaison Committee does not have the final decision.

Admiral HAYWARD. It does not; no, sir. The NACA worked very successfully, Mr. Bass. This Committee we have had, has not had a final decision.

Mr. BASS. Yes, sir.

Admiral HAYWARD. What I favored now, I say the proposed legislation does not go to this now, it just goes to change the present law.

Mr. BASS. We are considering——

Admiral HAYWARD. You could do this and have it work; yes, sir. This would be a way to get programwide management and also you would be able to argue very effectively against the Bureau of the Budget.

The CHAIRMAN. The gentleman's time has expired. Mr. Hechler?

Mr. HECHLER. I am deeply impressed by your suggestion, Admiral, that we have a joint congressional committee. I think it is incumbent on us in Congress, if we call on the American people to make sacrifices and if we expect the executive branch to make sacrifices, we in Congress ought to make some sacrifices ourselves. On such a joint committee I will probably never be called on for questioning until about 1 o'clock, but I think this is an excellent suggestion. It would save you a lot of time in testifying before committees and I think it would provide a useful control and reporting device which would strengthen Congress.

On this question of a space director above the two agencies, I think there are a number of very compelling arguments in favor of such an individual. As a matter of fact, I think I will throw in an amendment to title 3 which will set up a Director of Space and Aeronautics who would have the power of the purse, but, in addition, would have the power of the Presidential office. Perhaps we could put him over in the East Wing of the White House where Jimmy Byrnes and Fred Vinson operated when they ran the Economic Stabilization Agency.

It seems to me there are a number of arguments in favor of this. You talk in your statement on page 2 about the necessity for making available information, coordination, consultation, responsiveness.

Admiral HAYWARD. Yes, sir.

Mr. HECHLER. But it seems to me that what we need at this critical time in this Nation is not exchange of information but decision; not coordination but leadership; not a postal clerk but a quarterback.

Admiral HAYWARD. That is right.

Mr. HECHLER. And the type of programwide review that Mr. Fulton was mentioning, I think could be achieved with a very, very small staff under this Director of Space and Aeronautics who would operate immediately under and with the power of the President.

Now, I am disturbed by the number of people that come before our committee and say: "Well, all we have to do, since we are all friends, we can pick up the phone and talk back and forth, and there are channels of communication." But the public does not see those channels. The public does not understand. In addition to that the friends that those in the Department of Defense and NASA may now be, may later be replaced by people that would not be friends. We have a government of laws, not of men. I think that we have to create a situation which will resolve these conflicts, not only resolve them but anticipate them and be able to provide the clearcut leadership necessary to move forward.

I think that this is the solution which would not mean the extreme reorganization which you fear and some members of our committee fear.

Admiral HAYWARD. Yes, sir. Mr. Hechler, you have seen Senator Young's bill on the establishment of the Department of Aeronautics and Space with a Secretary of Aeronautics and Space?

Mr. HECHLER. I would not want to set up a new department or a new layer as Mr. Fulton said.

Admiral HAYWARD. That is S. 3085.

Mr. HECHLER. I do not want a new layer. I want a man who has the power of decision, a single individual, not a long, narrow, and wooden board, like the Activities Coordinating Board. Let us have a man who can make the decision.

Would you care to comment further on the difficulties with such a proposal, perhaps?

Admiral HAYWARD. It goes right back to the funding, is he the man that has the responsibility and the authority?

Mr. HECHLER. He has the Bureau of the Budget with him.

Admiral HAYWARD. I have found, Mr. Hechler, one of the hardest things to get in this city is a decision. A decision is never a decision, it never sticks.

Mr. HECHLER. The difficulty is we look at the President too much as an individual. The Presidential office is an institution. I worked over there for a few years. President Truman made all his own decisions. But if the President doesn't make the decisions, they can be made in the Presidential office.

Admiral HAYWARD. Sure they can be made.

Mr. HECHLER. They can be made if you set a man up with the power of the Presidential office in the East Wing of the White House with the Bureau of the Budget serving him. We have had the example with Byrnes and Vinson. They did a good job.

Admiral HAYWARD. Yes, sir. You could do this, and it would work, I am sure, but you have to give him the responsibility and the authority.

Mr. HECHLER. Isn't this easier than putting it all into the military and having a big reorganization?

Admiral HAYWARD. I do not know. I would not be prepared to say yes, it is easier, or not.

Is he going to assume all of the responsibilities that the Secretary of Defense has?

Mr. HECHLER. Well, I would assume that he would have to have the power of decision on conflicts between DOD and NASA to set the goals.

Admiral HAYWARD. If he is not responsible—you see, Mr. Gates is responsible for the defense of the country. He has got a very strong position. You cannot give this man any responsibility in this field and still expect Mr. Gates to have the responsibility of the defense of our country. You see, he can make—it is so intertwined, this is why I say now if you are going to make one program that it eventually will wind up under the Secretary of Defense, because no matter what you say, it is a defense matter.

The CHAIRMAN. Your time has expired.

Mr. Chenoweth?

Mr. CHENOWETH. Admiral, when you were here before the committee previously, I remember you expressed the belief and the conviction that we were making substantial, real progress in the space field.

Admiral HAYWARD. Yes, sir.

Mr. CHENOWETH. So in spite of all this speculation and differences of opinion as to whether we are going to have one board or two boards or a head man, we really have gone ahead with the space program both in the defense and civilian use?

Admiral HAYWARD. Yes, sir; we are going ahead.

Mr. CHENOWETH. I get the impression that the house is on fire and the fire department is debating whether they are going to use a red or green color hose to put it out instead of saying "We had better put the fire out."

Admiral HAYWARD. No, sir. We have, as Dr. Glennan has told you, some way to go before we can compete in the payload business, but in the rest of the business we have done very well.

Mr. CHENOWETH. I think that is an important message to get to the country.

Admiral HAYWARD. I do, too.

Mr. CHENOWETH. You are doing your part. The common impression has been created that we are standing still and doing nothing in the space effort while the Russians are shooting the moon and going all out. As you say, except for this thrust question you think we are ahead of the Russians?

Admiral HAYWARD. Yes, sir; I do.

Mr. CHENOWETH. I respect that opinion because I know you have been very close to this whole program and I think you have done a great job, you and the others engaged in it. We are making real progress. I think what happened last week is a pretty good example of what we are doing.

Admiral HAYWARD. Yes, sir. I am surprised, with apologies to my friends on the press, it did not get on the ninth page. If it had blown up, like the Titan, it would have gotten on the first page. When the Polaris succeeded it was on the ninth page. But this was a very fine effort and there are a lot of other ones going forward. I do not agree with all these people going around weeping and wailing and saying that "We are so far behind, we will never catch up," and things of that kind.

Mr. CHENOWETH. It seems to be popular in Washington, and I suppose elsewhere, to upgrade everything the Russians do and downgrade everything we do. I have never been a party to such philosophy and I do not think you are, either.

Admiral HAYWARD. No, sir. It is always popular to criticize. It is easy to set up in that business.

Mr. CHENOWETH. You think this bill would be a step in the right direction?

Admiral HAYWARD. I am convinced at this point that we are going to go ahead, that with the people involved in the program, it will improve. I am sure I will be back here next year or the year after and you are going to change this.

Mr. CHENOWETH. The whole fate of the space program is not depending on whether we pass this bill or not?

Admiral HAYWARD. No, sir——

Mr. CHENOWETH. You think it would be an improvement?

Admiral HAYWARD. It would be a very sorry program if it were.

Mr. CHENOWETH. That is all, Mr. Chairman.

Mr. FULTON. Would you yield?

Mr. CHENOWETH. Yes.

Mr. FULTON. I want to ask the admiral whether he ever sized up the value of his scientific reports by the number of enlisted men in the Navy who buy them? When you are referring to newspapers you are referring to quite a different thing. So if you are going to decide whether your reports are valuable by the number of enlisted men that buy the documents I think you are going to be badly disappointed. I am depending on newspaper people because I am——

Admiral HAYWARD. You are depending on newspaper people to get the message.

Mr. FULTON. If you are going to use the basic common denominator in order to get the message across you are going to have to sell them newspapers.

Admiral HAYWARD. Yes, sir, we are doing our best to do that.

Mr. FULTON. I am pointing out to you that you are not responsible for the number of enlisted men who buy your scientific reports because yours is a different field.

Admiral HAYWARD. No, sir, that is correct.

Mr. HECHLER. Will the gentleman yield? Is he referring to manuals? [Laughter.]

Mr. FULTON. My point——

The CHAIRMAN. The gentleman has left. I do not know whether his time has expired or not, but he has gone.

Mr. FULTON. May I just finish? I have a serious point. The question is with regard to Mr. Quarles: You had previously said that the Deputy Secretary of Defense had made decisions that bound the rest of you with regard to the Civilian-Military Liaison Committee. Could you tell us when those decisions were made and how they were made? Because if that is the case, it would seem to me that the Deputy Secretary of Defense was the Jack that cut the beanstalk, rather than just have it whither on the vine.

Admiral HAYWARD. Yes, sir, Mr. Fulton. Those were made right after the passage of the act. They were such things as the weather satellite went over to NASA, passive communications went over there, and we were not consulted at all. This was made between the Deputy Secretary and the Administrator.

Mr. FULTON. That is why the CMLC died on the vine, too?

Admiral HAYWARD. That is right.

Mr. FULTON. Because they made the decision.

Admiral HAYWARD. That is right.

The CHAIRMAN. Mr. Daddario?

Mr. DADDARIO. Admiral, last year you showed us some films of the Johnsville centrifuge facility.

Admiral HAYWARD. Yes, sir.

Mr. DADDARIO. And some of the other experiments that the Navy was making in the field of aerospace medicine. I wonder what your opinion is of the present capacity of the military facilities in the aerospace medicine field to take care of our present requirements in this area and to grow, as necessary, in order to take care of our future requirements?

Admiral HAYWARD. Well, we need more facilities. For instance the tools—that centrifuge is a very essential tool. As we go along,

I can see that you can make improvements to that tool. I am sure that the facilities at the present are adequate to do the program we have right now. But when you put this program further forward, you will not have the tools of these facilities to do the overall program.

Mr. DADDARIO. I add to those the Air Force facilities at Wright, et cetera.

Admiral HAYWARD. Yes, sir. That I think is pretty much across the country. But this, like most of the R. & D. business, grows. We are already involved in the 1962 budget, and in looking at our programs, you can see right now when you need these tools.

Mr. DADDARIO. Then your answer is that the military has the present capacity to meet the requirements that now exist, and their capacity can grow, and will grow, to take care of future requirements?

Admiral HAYWARD. It has to grow, yes, sir.

Mr. DADDARIO. All right. Referring to the recommended amendments to the Space Act, who would decide or who should decide whether or not NASA should also get into the field of aerospace medicine?

Admiral HAYWARD. This is a real good question. I would say offhand that they should not get into it. The Department of Defense will do any of the aerospace medicine that they need. There are people involved and we have the people and the facilities and the doctors involved in the work, both in the Air Force, in the Navy, and the Army. I think that the decision between the Secretary of Defense and Dr. Glennan would be that the Department of Defense would do it, that NASA would not get in it.

Mr. DADDARIO. Then as you see it, and looking into the future, if NASA has any requirements in this area, all it would have to do would be to hand them over to the Department of Defense, and the Department of Defense, utilizing its present facilities could take care of them?

Admiral HAYWARD. Yes, sir, and we would. For instance, Johnsville has been used every bit as much by the space agency as by ourselves. Scott Crossfield has used it. I do not know how many flights he made in the simulator.

Mr. DADDARIO. And if NASA were to build a facility of its own, or if it had the desire to build a facility of its own and add people within this particular area, would we not be getting into the area of duplication?

Admiral HAYWARD. Yes, sir. Actually, I do not think it would make good sense. What happens when you build something new like that, our people will get better jobs over there, they will get higher civil service ratings, things of this kind. We would lose our people, too, and as a result, the overall effort would suffer.

Mr. DADDARIO. If we could just for one moment go to another subject, Admiral.

You have made the statement that we are not behind the Russians except in the thrust field. Do you believe that we are taking the necessary steps in this area of thrust to catch up with the Russians within the near future and do you think it is important that we catch up with them in the field of thrust?

Admiral HAYWARD. Yes, we are taking steps to do this and I think it is important. And when I talk about being ahead of the Russians,

there are some fields, for instance outside of the thrust, in which they are ahead of us. I will give you a good example. They are probably the best pure mathematicians in the world. They probably do more work with nonlinear equations than any of our designers do. They do have some fields that they are ahead otherwise, other than the thrust. However, I think it is important, also, that we have the capability of placing large payloads into space.

Mr. DADDARIO. And this has military potential as well, does it not?

Admiral HAYWARD. At the moment I can't name any one weapons system that would employ it. I can tell you it has great military potential. Like any research or development program you do not know until you actually see. This is why their peaceful uses of it are going to give rise to military applications. But we do not have any military system, for instance, tied to the Saturn booster.

Mr. DADDARIO. Certainly it is important that we take into consideration the psychological aspects.

Admiral HAYWARD. Yes, sir.

Mr. DADDARIO. The posture of the United States in the minds of the peoples of the world is so important that we must not allow the Russians' capacity to produce a thrust greater than ours to continue. We must also compete in the sensational and spectacular features of space.

Admiral HAYWARD. We have to compete; yes, sir.

The CHAIRMAN. Mr. Moeller?

Mr. MOELLER. Admiral, I think of all the military people who come before us, you are one of the most frank and honest; you always tell us what you think, and how you evaluate the present situation.

We heard a good flag-waving speech a moment ago. One of our colleagues gives this every time somebody from the military comes before us, I think. We are always led to believe that everything is very good with us, that we are complaining too much, and that the American space program is a good program, and we are even with the Russians or we are ahead of the Russians, and all this and that and the other. Then we have men like General Medaris who has told us how he feels about it; we had Mr. Lanphier before us some time ago, a man who gave up a very good job to get out and protest against the present program.

Now it becomes clearer and clearer to me that we are more and more confused on just where we do stand today. There is a man in town who was in my office yesterday who told me he had spent 3 weeks in January, using part of his vacation because he is so vitally interested in the space program, and he contacted literally thousands of people and asked them a few simple questions about the U.S. space program. These have now been reduced by him into several clearcut statements which the hoi polloi make and which the people who are in the know make, both military and civilian. The first two are: No. 1, we have no leadership in the space program; No. 2, we do not have a space program. I will not give you all the others.

Now are you in agreement with this? Are you in agreement with the man who makes the flag-waving speech to the effect that we are okay? Are you in agreement with Medaris, and with Lanphier who said we are so bad off that I am going to quit my job to get out and awaken the American public to the urgency? Is the man who is

going around here with this questionnaire getting a good answer when he comes back and says no leadership, no space program—I will stop there, because the others are not very complimentary. What do we believe today?

Admiral HAYWARD. This is a very good question.

Mr. MOELLER. All those questions?

Admiral HAYWARD. It is a long question. There are apples, oranges, and pears. [Laughter.]

Admiral HAYWARD. When I talk about the technical program, everybody uses the word "Space." Two years ago I said space was a place, it is not a program. Space is not a program. It is a place. And this is the point. What is it? When I am doing molecular electronics over here that has application to all sorts of things, sure it is used in the Pioneer, but is it a space program; is it a radar program; what sort of a program is it? So when you come and ask me questions like that, there is no easy answer to it at all. The fact is that people have degraded our performance, there is no question about it. But there is a little bit of truth on both sides or there would not have been anything said. Frankly, some of the statements are not in accordance with the facts. I can name fields where nobody has any arguments.

You say in space? You name my friend Admiral Rickover and the nuclear submarine and Polaris, who has any system like this? Where have they been? What belt do they call it up in the sky? Do they call it Federoff? No, it is Van Allen.

A lot of people have a lot of axes to grind in this, too, as far as hardware and things are concerned. I have been as critical of some of the programs, I guess, as anybody. I do not believe in Fortress America, as I told you; I do not believe in a lot of the statements that have been made, I do not believe in Target USA; I believe that the sea is the best asset we have. Who controls it today? Who has controlled it for years? And yet we continually degrade our jobs. Look at General Schriever's job. I can show you others. Look at Medaris' job.

I do not feel that it is as bad as the calamity howlers say, but I do not think that it all glitters either. If we continue the way we are going, and this is the fourth budget I have seen, our capabilities are going down. Today we are all right, but we will not be all right if we continue the line that we are going on now. In level funding, the effort gets less, and you go down. There is no question about it.

Mr. MOELLER. And you would certainly want more basic research for the future?

Admiral HAYWARD. Certainly I do.

Mr. MOELLER. In other words, we may look good today by comparison.

Admiral HAYWARD. That is right.

Mr. MOELLER. But these next 2 or 3 years are the years we are going to be concerned about.

Admiral HAYWARD. The one thing that people do not address themselves to and I do not think Mr. Lanphier did, was the momentum the Russians had. They are talking about an airborne alert today. For instance, let us take the air alert, this is a good one. Why do you want an air alert? Because you did not do your job good

previously, technically, and you are now vulnerable. You knew and I did 5 years ago that we were going to have accurate ballistic missiles. The B–70 will not change it, it will be just as vulnerable. What you have to do is to get systems that are not vulnerable and that no matter what he does, that you do not place a premium on a surprise attack.

Mr. MOELLER. May I get in another quick question?

Admiral HAYWARD. Yes, sir.

Mr. MOELLER. Your request for the wind tunnel was deleted by the Bureau of the Budget?

Admiral HAYWARD. Yes, sir.

Mr. MOELLER. Is it accurate to say that if we are suffering today from a lack of basic research, it is the Bureau of the Budget which is responsible?

Admiral HAYWARD. Well the Bureau of the Budget, Mr. Moeller, is a very good whipping boy.

Mr. MOELLER. I know, they cover a lot of things. But could we pin it on somebody else?

Admiral HAYWARD. My feeling is that the Bureau of the Budget should not make technical decisions. That is really what I say.

The CHAIRMAN. The gentleman's time has expired. Mr. King?

Mr. KING. Admiral Hayward, let us assume for the sake of argument that the Russians were to lend us the superbooster launch vehicle of 800,000 pounds thrust. Equipped with that could we duplicate their feat of photographing the back side of the moon in the rather spectacular way that they did 6 months ago?

Admiral HAYWARD. Yes, sir, as far as the sending business is concerned, I am convinced we could, yes, sir.

Mr. KING. I had heard that we were quite a ways from achieving that technology.

Admiral HAYWARD. No, sir, we could take a picture of this kind.

As a matter of fact, we will see how the Pioneer goes, the communications side—I think that is well within the state of the art. The real problem was the guidance, to get it up around and also to get the information and then to transmit it.

Mr. ANFUSO. Dr. King, will you yield to me for a quick question?

Mr. KING. I yield.

Mr. ANFUSO. There have been some reports recently in the press that those photographs taken of the moon were not actual photographs, but were paintings. We do not believe that; we would like to have your views on it.

Admiral HAYWARD. I read that, and I am afraid that somebody just wants to sell a story.

Mr. MOELLER. You are not a painter——

Admiral HAYWARD. They are not paintings.

Mr. ANFUSO. Thanks, Dr. King.

Mr. KING. Getting back to this wind tunnel; what was this?

Admiral HAYWARD. Hypersonic, up in Mach 20, 25, you see.

Mr. KING. You say that you put in a request for about $2 million to cover this, and that it was deleted by the Bureau of the Budget on the grounds that it had been duplicated in NASA?

Admiral HAYWARD. It was duplicating NASA's functions, not that it had been—we were duplicating NASA's functions.

Mr. KING. In effect the Bureau of the Budget became, de facto, if not de jure, this superorganization that had the final veto power over DOD and NASA, right?

Admiral HAYWARD. That is correct.

Mr. KING. Then, of course, the question comes, getting back to Congressman Hechler's proposal: Should we not have an organization that is given that function de jure and clothed with all of the powers and technical staff and assistants and all that it needs, working with the President; rather than to achieve this result indirectly and de facto, and in this wholly unsatisfactory manner?

Admiral HAYWARD. On the hopes that he could storm the Bureau of the Budget. I mean the Bureau of the Budget could still do this, remember, after he had made the decision, and after they sent it forward to Congress, but it would have been better. In this case, I might have gotten my wind tunnel.

Mr. KING. But the Bureau of the Budget was making a technical decision.

Admiral HAYWARD. That is right.

Mr. KING. Obviously a decision in which it has no competence.

Admiral HAYWARD. That is right.

Mr. KING. Now, this organization which the Congressman talks about, or one man with a staff, if clothed with the technical competence to make that type of a decision, I do not believe the Bureau of the Budget would have the effrontery to overrule a purely technical decision on technical grounds.

Well now, if that be true, would there not be merit in this type of setup to accomplish that very purpose?

Admiral HAYWARD. In that case there would be; yes sir, Mr. King, very much so.

Mr. KING. That is all.

The CHAIRMAN. Now, may I ask you a question? Mr. Morris?

Mr. MORRIS. No questions.

The CHAIRMAN. He has moved. Mr. Morris, do you have any questions?

Mr. MORRIS. No questions, Mr. Chairman, at this time.

The CHAIRMAN. I would like to ask you this question, Admiral: you refer to the desirability of having all of space in one department, and of course you favor the military. Well, I have spent 23 years of my life in Congress working for the military. I admit I have got a warm spot in my heart for the military. But let me ask you this: Did you make the same recommendations regarding atomic energy?

Admiral HAYWARD. No, sir. My original recommendation before the select committee was to make it a civilian agency, Mr. Chairman.

The CHAIRMAN. Why shouldn't atomic energy work be done by the military? Surely, if there is a military weapon the atomic warhead is a military weapon?

Admiral HAYWARD. My point was, Mr. Chairman, that originally I proposed to the select committee that it be like the Atomic Energy Commission, a civilian agency. Two years have gone by but you could make it a civilian agency like Pickering says and you could make a military one like Medaris says, either one would work, there is no question in my mind.

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The CHAIRMAN. If the military were given a division in the NASA for military applications, do you think that that would give the military the entree into the NASA that they would need? I am one who believes that the military should not be held back in its desire and need for information to use in developing the defenses of this country.

Admiral HAYWARD. I feel, Mr. Chairman, that somewhere in the system the Department of Defense has got to review programwide NASA's program, just as Mr. Fulton was saying.

The CHAIRMAN. Would you put that in a military applications division?

Admiral HAYWARD. You could put it in the MLC. But it should be programwide.

The CHAIRMAN. What I do not understand is that there are so many people, and I think you are one, that share the view that the Space Council would not work because it just places another agency between the President—I do not mean to quote you on that, I am not trying to put you on the spot.

Admiral HAYWARD. No, sir.

The CHAIRMAN. Now, we had a witness the other day who said: Well, if we abolish the Space Council, we would certainly give part of their duties to the National Security Council. Well, isn't the National Security Council in the same relative position as the Space Council?

Admiral HAYWARD. Yes, sir.

The CHAIRMAN. Is that not correct?

Admiral HAYWARD. Yes, sir; that is correct.

The CHAIRMAN. And if the National Security Council has authority over the Secretary of Defense in matters of security of the Nation, what is wrong with the Space Council having similar authority?

Admiral HAYWARD. Well, the real difficulty with the Space Council was that the President had to preside over the meetings. I mean it was put up at too high a level.

The CHAIRMAN. I think the President sent a request to the committee to the effect that he wanted to be Chairman. I think that was a mistake, and I said so at the time, because I do not think the President, or any president, has the time to perform all of the functions that Congress requires of him. Is that not right?

Admiral HAYWARD. That is correct, Mr. Chairman.

The CHAIRMAN. Then, you feel that the main difficulty, with the Space Council is the fact that the Chief Executive has not been able to give the time to it that it requires?

Admiral HAYWARD. That is correct. If you had left the original NACA Committee there you would not have had any problem.

The CHAIRMAN. Yes. Then as far as the authority over the Defense Department is concerned, it would have the same authority which the NACA had, or which the National Security Council has?

Admiral HAYWARD. Yes, sir, it would work.

The CHAIRMAN. Mr. Wolf, did you want to ask a question?

Mr. WOLF. I just wondered if the Admiral would like to discuss in a few words the plan regarding the satellite that we hope will orbit the sun.

Admiral HAYWARD. Well, it is a communication—as a matter of fact, there are many tests being made on it, distant communications,

turning on and off transmitters at great distances, the use of solar cells, which are the same things that went into the Vanguard, for your power. I do not know what the distance was this morning, but it was a good half million miles away, I guess, by this morning. It is a very complex experiment. You have the electron fields, the densities, you are really going to get some information on space.

Mr. WOLF. This is really deep space, too.

Admiral HAYWARD. Yes, it is.

Mr. WOLF. Will this be orbiting the Sun between Venus and Mercury?

Admiral HAYWARD. Yes. I think when it gets back here it will be 311 days. I have not seen the latest calculations on it. Dr. Hagen was talking the other day about it. But it is a very fine experiment. If you have seen the 10-year program for NASA they have some very excellent programs to get fundamental information, and this is fundamental information, of course, that they are obtaining. I think it is a very fine job, myself.

Mr. WOLF. Are we getting any technical advice—this is perhaps way off the subject and I do not want to belabor the point—are we getting any technical advice from other nations on these deep space probes?

Admiral HAYWARD. Yes, we use everybody, the British. We have a lot of astronomers, of course, that have lots of ideas on astrophysics. I know Dr. Pickering and California Tech are very much involved in this with the other people. They used to open papers on this in the Physical Society, and all of Western scientific people are pretty much helping us across the board, not only in the weapons business but in the space business.

The CHAIRMAN. A motion has been made to adjourn but we will suspend consideration of it until we get in a question from Mr. Hechler——

Mr. WOLF. Yes, sir. You want to ask——

Mr. HECHLER. I yield one-quarter to you.

The CHAIRMAN. Admiral, you are a very attractive witness. We cannot cut the members off from questioning.

Mr. WOLF. I had introduced a resolution earlier this week calling for cooperation with our friends in the world, giving a portion, perhaps, of a satellite to experiments that might be conducted, say, by the Japanese or by the English, on a space available basis. I am wondering what your reaction to this type of thing might be.

Admiral HAYWARD. It is excellent. I agree 100 percent with it.

The CHAIRMAN. Mr. Hechler.

Mr. HECHLER. Admiral, I am sort of new here. I wonder if you could tell me when Columbus set forth in 1492, did his voyage have military or peaceful and scientific significance?

Admiral HAYWARD. It was military.

Mr. HECHLER. Do you really mean that it had no peaceful and scientific significance?

Admiral HAYWARD. It was a voyage of discovery, but the king and the queen, as you know, supported it, it was primarily a military venture.

The CHAIRMAN. He did not have much basic research, though, Admiral.

Admiral HAYWARD. He sure didn't. He did not know how to find his longitude, that was his problem.

Mr. DADDARIO. There was a commission, too, that kept it from going along for 4½ years.

[Laughter.]

Mr. HECHLER. That's exactly why there should be a man at the top to make the decisions.

The CHAIRMAN. Not the Liaison Committee.

Mr. DADDARIO. The commission called the Travera commission held it up for 4½ years.

Mr. QUIGLEY. I do not know who has the floor, but I would like somebody to yield for a suggestion. Maybe the answer to this whole thing is to put a woman at the top of it.

Mr. DADDARIO. It depends on which woman.

The CHAIRMAN. The gentleman is out of order. Mr. Fulton has the floor.

Mr. FULTON. We were talking earlier of the description of the Moon and this is rather humorous, but it also has a serious aspect because it is always coming up. The question had been on the back side of the Moon. Certainly there must be some better geographical description that the "back side of the Moon." Possibly it is the two-thirds that is invisible.

Mr. MCDONOUGH. The other side.

Mr. FULTON. As distinguished from the visible part. What is the technical description of that far side, not the cis-lunar side of the Moon?

Admiral HAYWARD. Actually, I hate to admit that most people use "the back side of the Moon." There is no technical word to my knowledge, Mr. Fulton, for describing it. It is the far side of the Moon. I cannot recall any astronomical term.

Mr. MOELLER. Isn't there a counterpart to cis-lunar?

Mr. FULTON. It is translunar, but I do not believe that is the obverse of cis-lunar.

Admiral HAYWARD. No.

Mr. FULTON. I do not believe that is used geographically.

Admiral HAYWARD. No, I do not think it is.

The CHAIRMAN. Does the Navy glossary have something on that?

Admiral HAYWARD. You have got me.

The CHAIRMAN. Any further questions? If not, Admiral, we certainly thank you. Your testimony has been very candid, and you have been very cooperative. We want to commend you and witnesses like you, for coming before this committee.

Admiral HAYWARD. Thank you.

(Whereupon, at 11:54 o'clock a.m., the committee was adjourned, to reconvene at 10 o'clock a.m., Wednesday, March 16, 1960.)

TO AMEND THE NATIONAL AERONAUTICS AND SPACE ACT OF 1958

WEDNESDAY, MARCH 16, 1960

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND ASTRONAUTICS,
Washington, D.C.

The committee met at 10 o'clock a.m., Hon. Overton Brooks (chairman) presiding.

The CHAIRMAN. The committee will come to order.

I am told that the clock up there is a little bit slow. We have been going by that. I think we had better get a repairman to take care of it so we will be on time. We don't want to keep our distinguished witnesses, like those we have this morning, waiting unnecessarily.

May I say here to the members in attendance this morning—and others will be in later—tomorrow morning we are planning a very important ceremony before this committee. The Secretary of the Air Force has decided to present the committee with an Air Force flag to accompany the Army flag which we have behind us. He and the Chief of Staff of the Air Force will be on hand tomorrow morning. I want to tell the members beforehand there will be pictures taken. Gentlemen, this will be an important event. There will be pictures taken, and if the members want to get in the pictures, they will have to be here on time. We will start right on the dot tomorrow morning.

I want to take the opportunity to say that the Department of the Navy has also notified us that the Navy flag will be presented to the committee in the near future. We will then have the full complement of flags in the committee room, the Army, the Navy, and the Air Force.

Mr. FULTON. Mr. Chairman, no, we won't, we don't have the Marines' flag.

The CHAIRMAN. You don't consider the Marines a part of the Navy, but the law does.

Mr. FULTON. Harry Truman tried to leave them out. That was a mistake.

The CHAIRMAN. The chairman doesn't want to leave them out. Of course, we respectfully say that we will be very happy to receive a Marine Corps flag, and I think I can speak officially for the committee that there won't be any dissent.

Mr. KING. That is correct.

The CHAIRMAN. But at any rate we are making progress and it will help the looks of the committee room. We will have beautiful committee rooms in this new office building that is being built, quar-

ters that every member of the committee will be proud of. I think that the flags will fit in there and make the room lovely, and add to the committee setting.

This morning we have Maj. Gen. W. W. Dick, Jr., Director of Special Weapons, Office of Research and Development, Department of the Army.

General, you have a prepared statement, don't you?

General DICK. General Trudeau has the statement.

The CHAIRMAN. Yes, we also have Gen. Arthur G. Trudeau. I have a copy of your prepared statement, General Trudeau. I don't see one for General Dick.

General DICK. I have none, Mr. Chairman.

The CHAIRMAN. You have none?

General DICK. That is right.

The CHAIRMAN. Then we will take the prepared statement of General Trudeau.

General Trudeau is a grand friend of ours. We have had him here before. I have known him for years. We are certainly happy to have you here today.

Mr. HECHLER. Mr. Chairman, may I make an observation before we start?

The CHAIRMAN. Yes.

Mr. HECHLER. We are proud today to have a group from Lawrenceville School, Lawrenceville, N.J.

The CHAIRMAN. The gentleman now represents the State of New Jersey?

Mr. HECHLER. Having formerly taught at Princeton University, this was once in my district.

The CHAIRMAN. We are happy to have you young people from Lawrenceville, N.J., here with us this morning. If you aren't able to hear what these distinguished witnesses have to say, let us know. We will ask them to speak a little louder so you can get the benefit of their testimony. I might say that the representatives of the Army would like to conclude their testimony at 11:30 this morning, so that they can show the committee a new film. This film should be of great interest to the committee. The film is classified, so we will have to go into executive session for the showing.

Since we are pressed for time, we would appreciate your proceeding with your statement, General.

STATEMENT OF LT. GEN. ARTHUR G. TRUDEAU, CHIEF OF RESEARCH AND DEVELOPMENT, DEPARTMENT OF THE ARMY, ACCOMPANIED BY MAJ. GEN. WILLIAM W. DICK, JR., DIRECTOR OF SPECIAL WEAPONS, OFFICE OF CHIEF OF RESEARCH AND DEVELOPMENT, DEPARTMENT OF THE ARMY

General TRUDEAU. Mr. Chairman, members of the committee, I am Lt. Gen. Arthur G. Trudeau, Chief of Research and Development, Department of the Army. I had the privilege of appearing before you a few weeks ago at which time I spoke about the Army research and development program with the emphasis on space applications. Today, at your request, I will speak briefly about the proposed legislation to amend the National Aeronautics and Space Act. In response

to questioning on H.J. Res. 567, the Secretary of the Army forwarded to you his views on the bill now under consideration.

I feel that an important requirement in our national space effort is to insure a positive and effective means of continuous coordination between the Armed Forces and NASA. Regardless of any separation of military and civilian space programs, there is still a considerable overlap in the knowledge and techniques, and to some extent the hardware, required in each. There will also be a constant need for the mutual exchange of information gained from the respective research and development efforts.

With the abolition of the Civilian-Military Liaison Committee, originally established to provide such coordination, the only prescribed channel will be directly between the Secretary of Defense and the Administrator of NASA. While this is appropriate for handling major policy matters, it will not provide for the free exchange of more routine information and requirements. In place of the Civilian-Military Liaison Committee, the necessity of at least informal liaison is obvious, and I assume that this bill will not preclude such informal arrangements.

Gentlemen, it is a privilege to appear before your committee, and I shall be glad to answer any questions you may have.

The CHAIRMAN. Thank you very much, General Trudeau, for your short but strong statement regarding this matter.

Before we ask questions; Mr. Yeager, we have received a statement from the Secretary of the Army, haven't we?

Mr. YEAGER. Yes, sir.

The CHAIRMAN. The statement is in answer to the question whether or not he had been consulted with reference to the preparation of this bill. It is a short statement. Would you mind reading it?

Mr. YEAGER. Yes, Mr. Chairman.

Under date of February 13, 1950.

DEAR MR. BROOKS: Your committee has inquired if the Army had been consulted on H.R. 9675, 86th Congress, a proposed amendment to the National Aeronautics and Space Act of 1958, and requested the Army's views on this proposed legislation. This information is inclosed.

ANSWER OF THE U.S. ARMY TO THE TWO INQUIRIES OF THE COMMITTEE ON SCIENCE AND ASTRONAUTICS OF THE HOUSE OF REPRESENTATIVES

I. Was the Army consulted in advance of the proposed amendments to H.R. 9675, 86th Congress?

The Army was not officially consulted on H.R. 9675 prior to its filing with Congress. The only advance information the Army had of this proposed legislation was when the patent provisions only were called to the attention of the Patents Division of the Office of The Judge Advocate General early last December. Mr. Morse, the Director of Research and Development, attended an evening working dinner meeting on January 12, 1960, with Mr. Glennan, NASA; Mr. Horner, NASA; Dr. York, Director of Defense Research and Engineering; Dr. Charyk, Under Secretary of the Air Force; Mr. Wakelin, Assistant Secretary of the Navy (R. & D.). The purpose of the meeting was to discuss the NASA 10-year plan. In the course of the meeting some verbal comment was made by NASA officials as to the general type of changes being suggested. No discussion took place on this comment and no paper was presented which could be relayed to the Army General Staff.

On January 18, 1960, the Army received the first copies of the proposed legislation when Major General Dick, Office of Chief of Research and Development, and Brigadier General Snodgrass, Office of Deputy Chief of Staff for Military Operations, accompanied Mr. Morse to a special meeting of the Research

and Engineering Policy Council at which an explanation of the proposed legislation was given.

II. What are the Army's views on H.R. 9675?

The Army's principal concern with respect to the proposed legislation is the lack of any established and continuing channel for coordination between the armed services and NASA. Section 309(c) of H.R. 9675 would require NASA and the Department of Defense to advise and consult with each other, but the means to do this, the Civilian-Military Liaison Committee, would be abolished by the proposed repealing of section 204.

Inasmuch as the armed services have a continuing and expanding requirement to make use of the space medium, it is essential that military needs, as well as military developments, be made known to NASA, and that ready access be available to keep in touch with the progress of NASA endeavors. To have no regular and established channel for advice, consultation, and coordination between the Department of Defense and NASA, would affect the capabilities of each organization to accomplish its objectives. To depend for this liaison on informal arrangements cannot assure the close and continuing interchange required to reflect the importance of its space efforts to the Nation and the intimate interests of the armed services and the NASA.

The Army suggests the creation of a Military Liaison Committee patterned after the committee provided by law to function between the Department of Defense and the Atomic Energy Commission. This would have the merit of not requiring NASA personnel to be taken from their duties to participate. The existence of such a Military Liaison Committee would take into account the fact that generally, military requirements have to be considered in NASA programs rather than the converse. However, such an organization would still provide for effective exchange of important information in the national interest.

The CHAIRMAN. General, I would like to ask you this first: Were you consulted in reference to the proposed legislation now being considered by this committee?

General TRUDEAU. No, sir, we were not consulted in connection with the legislation.

The CHAIRMAN. Have you studied it, General Trudeau?

General TRUDEAU. I have read the proposed legislation, the Space Act.

The CHAIRMAN. I know of no one who has a greater stake in research and development than you do. What is your view regarding H.R. 9675, as drawn up?

General TRUDEAU. Well, it has the official support of the Department of the Army, and as indicated by Mr. Brucker, he feels that there is the need for some definite forum or group to insure constant collaboration between the Department of Defense and NASA.

The CHAIRMAN. Mr. Brucker recommended something that is not in the bill, and that is the liaison type of setup similar to that which the Atomic Energy Commission has?

General TRUDEAU. That is correct.

The CHAIRMAN. Is that your idea, too?

General TRUDEAU. I favor it as a personal idea. I have read with care and participated in the preparation of Mr. Douglas' statement, and from an overall defense view it would provide for a degree of coordination that would be far superior to what existed under the CMLC, which was completely ineffective. I say this because in Mr. Douglas' statement he has provided that the Deputy Director of NASA and the Director of Research and Engineering of the Defense Department would have the authority, which I assume would be formalized by a joint directive between the Administrator and the Secretary of Defense, and this does provide for "the solution of

problems of mutual interest," an important phrase that never was included in the charter or instructions to the former committee.

And also in this is included the word "aeronautics," which is of increasing importance to the Army as we move into the field of aeronautic vehicles of the type we think we are going to need in the future.

The CHAIRMAN. You would have more research in aeronautics, would you, than is going on now?

General TRUDEAU. This is important. I read the press comment on Admiral Hayward's testimony yesterday. I can't speak for Admiral Hayward, but I don't think he was saying there was too much accent on space and not enough on aeronautics, in that frame of reference; but he was saying that there is an increasing tendency, as NASA expands its activities into the space field, to disregard the importance of aeronautics and aerodynamics, and inasmuch as he has made that statement, I support it, and I want to insure that the action within NASA maintains a high degree of competence in the aerodynamic field, particularly where the Army's interest is to fly low and slow and quietly, concepts that were thrown out the window 40 years ago, but that may have very great importance now with the advent of new power systems, which we hope they will assist in developing.

The CHAIRMAN. I will say this, I think this committee ought not to overlook the importance of research in aeronautics, either, because the promotion of research in aeronautics is a part of our work.

General TRUDEAU. Yes, sir.

The CHAIRMAN. In emphasizing space we should not eliminate aeronautics entirely. Now, what do you think of having a section in the NASA organization called the Military Applications Division, as does the Atomic Energy Commission? This Military Applications Division would be staffed by military officers and have the authority to keep up with progress as it is made, and use ideas which have military application as they are developed by NASA.

General TRUDEAU. When you ask me for my personal opinion on that, I am very strong for the establishment of a relationship, that is, similar at least to that which exists between the Department of Defense and the Atomic Energy Commission. In other words, this consists of a military liaison committee that would be under an Assistant Secretary of Defense, or probably under Dr. York's office as the Director of Defense Research and Engineering, and on the NASA side, would consist of a Division of Military Application.

Despite all that has been said in these days when we are struggling for the survival of our country, I think it is completely naive to consider that the military interests in space are secondary or unimportant. Gentlemen, at the present time they are primary, and there is no implication in the development of anything with respect to space that is not of serious military import, in my opinion.

The CHAIRMAN. Thank you, General.

Mr. McCormack.

Mr. MCCORMACK. I pass.

The CHAIRMAN. Mr. Fulton.

Mr. FULTON. I believe I speak for the majority leader when I say that both he and I join with you heartily in the belief that the mili-

tary must not be downgraded, but must have its appropriate place in the sun, in space.

The question is: Would you abolish the Space Council? Or would you move over into a ground that has been tried and tested when we had the National Advisory Committee for Aeronautics before it was turned into the National Aeronautics and Space Administration, NASA?

General TRUDEAU. You flatter me by asking me my opinion at the low level at which I serve, but I must state——

Mr. FULTON. I see three stars.

[Laughter.]

General TRUDEAU. I think the overall importance of space to our Nation is so great today that it should not be completely entrusted into the hands of one man, as much as I respect the tremendous capabilities of Dr. Glennan. Now, whether it should be a space council or not, is a serious question. I don't think that any conflict or difference of opinion between Dr. Glennan and the Secretary of Defense should have to be resolved by going directly to the President. I do believe that something similar to what existed in NACA, of either a commission, for which Dr. Glennan serves as the administrator, or a council, whatever you want to call it, composed of competent representatives, largely civilian, but with sound and adequate military representation, would be an additional insurance that the efforts in space are properly directed.

Mr. FULTON. I believe they had a civilian chairman from private life, too, in NACA.

General TRUDEAU. That is perfectly satisfactory, but they did have military representation as to the overall implications. I will tell you gentlemen that, frankly, and with the greatest respect for the talents of our scientists, that while you have frequently said that war is too important to be left only to the generals, war and the peace that we maintain to have is also too important to be left just to the scientists.

Mr. FULTON. In conclusion, then, the way the bill is submitted to us has not received prior Army approval; and secondly, as between the system that now exists, and the type which would be established under this bill, and then taking into consideration the atomic energy type of military liaison committee, you would prefer the latter, so that it is a matter of degree with you, is it?

General TRUDEAU. It is a matter of degree, that is correct?

Mr. FULTON. Of the three——

General TRUDEAU. The present bill is a good bill, it can be made to work. But the question always is: How much should we depend upon the particular personalities of the moment in an organization that is of such vital importance to our country?

Mr. FULTON. Putting them in order for you: First, you would choose the Atomic Energy type of liaison between NASA and the Department of Defense; secondly, you would take the proposals in the bill as submitted; and thirdly, the one that you favor least is the present legislation?

General TRUDEAU. That is right.

The CHAIRMAN. There is a fourth alternative, too. He would establish in NASA a division dedicated to military applications; is that right, General?

Mr. FULTON. Well, on the three proposals, I was trying to put them in order for you as to your preference. But I can see that there might be another type of liaison, and that would be accomplished by setting up a division of military applications within NASA. Would you comment on that as the chairman has suggested?

General TRUDEAU. Yes.

Well, I'll try—if I understand your several questions—and if I leave any of them out I will be glad to respond later, Mr. Fulton.

I think the present bill is a definite improvement over the old bill. I viewed the former Civilian-Military Liaison Committee as completely ineffective. I do believe that there is a need for constant collaboration between these important organizations. I do believe that the proposal submitted by Mr. Douglas is a workable solution and might be adequate.

I would, however, favor the strengthening of the overall position by insuring that the legislation be complete, and in that regard I do view the relationship between the Department of Defense and the Atomic Energy Commission as prescribing a pattern that might be quite proper for application to the Defense-NASA situation.

Mr. FULTON. Don't you think we should say, though, on behalf of Mr. Holaday, the Chairman of the CMLC, that it was really made ineffective right from the beginning, because Deputy Secretary of Defense Quarles decided not to use it, and he had made a more or less tentative agreement with the heads of NASA that they would bypass it. It really wasn't Mr. Holaday's fault?

General TRUDEAU. I believe this is a correct statement, and the charter or directive provided to Mr. Holaday was completely ineffective, as far as permitting or giving any authority, whatever, is concerned.

Mr. FULTON. That is all.

The CHAIRMAN. Mr. Hechler?

Mr. HECHLER. General Trudeau, you say that neither you nor the Army were consulted about H.R. 9675. If this is the way that the liaison is going to be conducted in the future, wouldn't you say this is a heck of a way to run a railroad?

General TRUDEAU. Yes; I would. Of course, again you get down to what is the viewpoint that exists in Defense with respect to the importance of their subordinate departments.

Mr. HECHLER. All right. Now you have emphasized here the necessity of exchange of information and coordination. It seems to me that the so-called Activities Coordinating Board, which Deputy Secretary of Defense Douglas recommended, is a very, very weak sister. All it does is simply set up existing officials and saying: "You will exchange information." It really doesn't get at what I believe is the basic problem, namely, how to achieve that precious power of decision; isn't that correct?

General TRUDEAU. Well, it leaves it open. What you have got here is a joint staff without a chief of staff, two men.

Mr. HECHLER. But you don't provide any real mechanism for clear-cut decision; isn't that true?

General TRUDEAU. No; unless there is mutual agreement, it then has to be referred to Dr. Glennan and Secretary Gates, and if the disagreement continues, then we have to go to the White House for what should be a scientific decision.

Mr. HECHLER. They say in their defense that they are good friends, they see eye-to-eye, they can pick up the phone and really decide things. But supposing new people come in during the coming months or years; wouldn't that make great potential difficulty?

General TRUDEAU. I think I have stated that I am always concerned about an organization that is dependent upon the personalities involved.

Mr. HECHLER. I intend to introduce an amendment to this bill which will set up a Director of Space and Aeronautics in the White House, who would have the authority and the power of decision in the crucial problems which you have mentioned; namely, such problems as the proper emphasis on aeronautics and aerodynamics in the whole total program, and would also have the precious power of decision, the ability not only to resolve conflicts but to anticipate conflicts, and the ability, also, to set goals for the future, to accomplish the type of programwide review that Mr. Fulton mentioned the other day that NACA had once done.

I wonder if this would not solve the problem a little bit better than simply setting up a mechanism whereby some papers can go from somebody's "out box" in one agency over to somebody's "in box" in another agency, without ever getting any decision made.

General TRUDEAU. It might, Mr. Hechler, but again you are adding another echelon and another staff, and we have got so many now that it is hard to poke through them.

Mr. FULTON. Would you yield for just a comment?

Mr. HECHLER. Let me just complete——

Mr. FULTON. You mentioned my name, and I just don't want to——

Mr. HECHLER. All right.

Mr. FULTON. I wanted to disagree with Mr. Hechler on the method. I don't think there should be another echelon put in. We agree in part.

Mr. HECHLER. Thank you. I am not suggesting another echelon, another layer, I am suggesting one individual so the American people can see where the decision is being made, where the responsibility is. You, yourself, General Trudeau, have testified before this committee this is not only a problem of what goes on here in NASA and the Department of Defense, it is a problem of an understanding and support by all the people in the country, and we can't bury these channels up and down the line. We have to have a man who will make the decision and will be able to move our country forward with a sense of urgency that it needs.

General TRUDEAU. The vital aspects of the defense problem today revolve around the Secretary of Defense, and if there are any problems to be resolved with respect to space and its defense applications, then the Secretary of Defense should be supreme in that field as the Cabinet member under the President responsible for our defense.

Mr. HECHLER. One further question, since you have mentioned some analogies with the Atomic Energy Commission-Department of Defense relationship, I am also impressed by the suggestions that we here in Congress might carry this one step further and set up a joint committee on space and aeronautics. What would be your reaction to that?

General TRUDEAU. I heard that that was mentioned. I think it has a lot of merit. We have a very great respect in my level at the Penta-

gon for the Joint Committee on Atomic Energy. It is a timesaver and it brings into consonance in a single group of presentations all of the problems that are placed equally before the House of Representatives and of the Senate. That is a personal opinion, and really has no bearing on the Congress.

The CHAIRMAN. Do you have any criticism of the operation of this committee, General Trudeau?

General TRUDEAU. Not in the least. You have been most helpful, believe me; no, sir; I could only commend it in every way.

The CHAIRMAN. We intend to be more helpful than we have been in the past.

Mr. Hechler, you have one final question?

Mr. HECHLER. You say mainly, decisions have to be made by the Secretary of Defense. In the development of the NASA program, aren't there some decisions that have to be made above the level of both NASA and the Department of Defense which involves something more than the exchange of information and the coordination that you are seeking, something which will set the national goal and anticipate and resolve in advance these potential conflicts which I believe we have created by these two separate agencies?

General TRUDEAU. What is the national goal in space? I don't know. The only goal that I see——

Mr. HECHLER. Somebody certainly should be setting it.

General TRUDEAU. All right. The goal of tremendous importance is to insure that we take the necessary steps in the exploration of space and the development of space vehicles, to use that as a broad term, to insure our survival, because it is not impossible that the development of a system, satellite system or system of space vehicles by the enemy could be overwhelming, as far as military power is concerned.

Mr. HECHLER. You don't think we have any scientific goal to be achieved?

The CHAIRMAN. The gentleman's time has expired.

General TRUDEAU. The scientific goal is compatible with the effort to defend ourselves in space and eventually to seek additional exploration.

The CHAIRMAN. Mr. Bass?

Mr. BASS. General, I am not sure just what your position is regarding the bill we are now considering, H.R. 9675.

Are you in favor of the provisions of this bill?

General TRUDEAU. The bill is a good bill, as far as it goes. It is an improvement on the old bill; I will go that far.

Mr. BASS. You mean the present law?

General TRUDEAU. The present law; yes, sir.

Mr. BASS. What amendments or changes would you make in this bill? Would you suggest that the committee make any changes in this bill?

General TRUDEAU. Well, any recommendations in that respect would be strictly my personal opinion. As far as the Army's official position is concerned, I believe it is felt that the step taken by Mr. Douglas to provide for a board that would have the power for the solution of problems of mutual interest in the event both sides concur, would be a step in the right direction and could quite possibly be an adequate solution.

However, I must say—and in this I am probably prejudiced because a military man does like the power of decision, and he likes unity in command and he despises split responsibility, my personal opinion is, as I have stated before, that the essence of the problem is primarily in the defense field. I think in any questions of difference between the National Aeronautics and Space Administration and the Secretary of Defense that the opinion of the Secretary of Defense should be paramount, inasmuch as all efforts in space do have a primary impact on our defense posture and capabilities today.

I do think that under the existing relationship a military liaison committee in the Department of Defense and a division of military applications under NASA would be highly desirable, would strengthen the bill. I think, above all, that there is the necessity for a commission, a council, call it what you will, that has the scientific and military competence to make decisions, if there are going to be splits, and also to guide the Administrator of NASA in his efforts, similar to what existed under NACA for some 40-odd years, and which was very effective.

But I want to tell you gentlemen that the development of the aircraft, as a military system, has had a tremendous fallout on the commercial application. After all, you see, the commercial jet plane is just the civilian version of what was justified and built to meet the military requirement. I doubt very much if our aircraft industry would be as advanced as it is today if the primary responsibility had been in NACA and not in the Army and the Army Air Corps and the Navy; in other words, the defense agencies that existed at that time.

Mr. Bass. General, let's explore your suggestion, as I understand it, a little more.

Now, under this bill, the President is given the final authority to resolve any disputes.

General Trudeau. This is right.

Mr. Bass. Disputes that cannot be resolved by DOD and NASA.

The President has his military advisers; he has his scientific advisers.

My question to you is why isn't he—under our Constitution the President is the commander in chief of our armed services, and Chief Executive—why isn't he the man that should decide these conflicts rather than some other new echelon or some other person?

General Trudeau. Well, gentlemen, in the complicated staff procedures that we operate under today, of course the final decision and the responsibility must rest on the individual who is making the decision. But that decision is usually shaped and formulated and sometimes directed by subordinates.

Mr. Bass. Are you suggesting that the Secretary of Defense should have the final decision, even though the President might disagree?

General Trudeau. No, no, I am not. But I am saying that the Secretary of Defense should not be in a position where he is contested by the Administrator of NASA when he has determined that something is necessary for military defense of this country.

Mr. Bass. But shouldn't the President have the final say on the problem? That would be a very basic and important policy——

General Trudeau. No; he shouldn't.

Mr. Bass. The President should not?

General TRUDEAU. Let me qualify that.

I say it is not necessary for the President to have it. The only reason is because you have raised the Director of NASA to a level where he is the equivalent of the Secretary of Defense, and actually his job is more comparable to the Director of Defense Research and Engineering, Dr. York, than it is of Secretary Gates, and I think it is almost unfair to force the Secretary of Defense, himself, with the tremendous problems he has, to operate on a level equal to that of the Administrator of NASA.

Mr. BASS. Now, earlier we heard Dr. York say that he felt that in nearly every case these conflicts could be resolved between DOD and NASA without going to the White House.

I would assume that only in the most unusual situations involving very important policy questions would it be necessary to take the conflict to the White House.

Now, I should think that the President should be the man to decide an important policy question like that, rather than somebody else.

General TRUDEAU. If I were the President, and I had that to decide, I would establish a council of about five outstanding scientists and military people to do that for me, and this is what I am suggesting might be established in connection with NASA as a council or a commission to guide it.

The CHAIRMAN. Mr. Daddario?

Mr. DADDARIO. General, in your short statement you show concern with the proper utilization of the knowledge and techniques that we have. Since there is overlapping, you recommend that something be done about coordinating the activities of NASA with the Department of Defense. I think that is about the backbone of the statement that you have made.

Now; section 309(a) of the bill says "nothing in this act shall preclude the Department of Defense from undertaking such activities involving the utilization of space as may be necessary for the defense of the United States, including the development of weapons systems utilized in space vehicles and the conduct of support research connected therewith.

Now, I'd like to get your ideas on how we might resolve a problem:

During the last few days we have had testimony involving aerospace medical research. NASA feels it ought to have an aerospace medical center, and has appointed a director of a department which will include within it this responsibility.

The Deputy Secretary of Defense, Mr. Douglas, has said he thinks they ought to have such a section.

Admiral Hayward said yesterday that he believes that the medical facilities which now exist within the Department of Defense, Navy, Air Force, et cetera, are sufficient to take care of our requirements, both present and future, and that NASA does not need to establish such facilities; he believes that it would be duplication if they have it, and that what should be done is that NASA should pass its requirements to the Department of Defense to handle within these existing facilities.

Now if this bill is passed, how do we resolve this particular problem? Who resolves it? Who makes the decision? How would it be done?

General TRUDEAU. You would expect that, if there are any contests in this area that are unilaterally resolved; maybe Mr. Gates or Mr. Douglas will just say, "Well, all right, you take all the aeromedical research," and this is what has been said to the Army with respect to our space capabilities. It has been said, "All right, you take ABMA, and you take JPL." We have been able and we are proud to have been able to afford NASA a space competency by virtue of their acquisition of the Army's space agencies, and perhaps this is the same way that they will acquire the aeromedical bases. In the services we have had a very considerable capability, and we have made these tests with primates, as you know. I still think there is a real medical problem involved here, because I am sure that the first man and perhaps most all of the men that go to space in the initial days are probably going to be people who have raised their hand in the defense of their country and wear their country's uniform, whatever kind of uniform you put on in a capsule.

Mr. DADDARIO. It seems we do lose something in the transfer, the transfer of the ABMA facilities. It certainly will, for awhile at least, slow down the program. But there has been an overlapping; there has been something in both areas. Here we are talking about a medical facility, a medical competence, in which a great deal of time, energy and effort has been put to develop it to its present point of proficiency, and it seems to have the possibility of growth in the future. NASA doesn't have any of this.

General TRUDEAU. I know they don't.

Mr. DADDARIO. It doesn't have it at the moment. The point is, why should there even be the thought of transfer, and why, if we now have the facility, should it not be used and allowed to grow along its present line of development? Why should there be any real need or desire to develop a similar or comparable facility somewhere else? And who should cut the cord that prevents it from happening?

General TRUDEAU. Well, you now force me back on my personal opinion again, and I am perfectly willing to be put in that position in the interest of truth and what I consider to be the facts of the case.

If you transferred to NASA the capabilities that exist in the services today in aeromedical research, I maintain that in our own interests we would have to establish it to the degree it is considered necessary by the military.

Now, this is primarily a responsibility today of our Air Force. This is primarily because of the large boosters and in the large warheads. But nevertheless, there is a definite Army interest in this, whether these are satellites that are going to be manned and maneuverable in space or whether some day man is going to the moon. And some day man is going to the moon, believe me.

The CHAIRMAN. The gentleman's time has expired.

Mr. Riehlman?

Mr. RIEHLMAN. General, do I understand your position correctly now that as far as this bill is concerned, you have no objection to it in its present form, other than that final decisions, assuming a dispute between the Director of NASA and the Secretary of Defense in respect to some research program or some development program concerned with the exploration of outer space, should rest with the Secretary of Defense and not with the President of the United States?

General TRUDEAU. Well, this is a difficult thing to say. Of course, everything rests with the President of the United States. But the Secretary of Defense is his knowledgeable representative, and I dare say he is probably more knowledgeable in matters in space that affect defense, than any individual on the White House staff that could make a recommendation contrary to his to the President.

Mr. RIEHLMAN. Well, suppose you have someone that disagrees with that position, and feels that because he is representing the Department of Defense that he is partial in his position and feels that Defense should have a greater interest—a greater opportunity to make these decisions?

General TRUDEAU. Well, of course, there is always the National Security Council that is available for any kind of consideration that you want to place before them that affects the security of our country.

Mr. RIEHLMAN. But we have to have someone to make the final decision, General. I think that is the thing that we are all striving to find out, where this authority should rest, so that we can hold someone responsible for making final decisions.

General TRUDEAU. [Nods.]

Mr. RIEHLMAN. Now to get back to this suggestion of Mr. Douglas that we have a board established; would you want such a board to have the authority to make the final decision?

General TRUDEAU. In the matters that come wthin their cognizance, I certainly would. Now, if they can't make the decision, then it has to be resolved at a higher level.

Mr. RIEHLMAN. Then it would naturally go up either to the Administrator of NASA, or to the Secretary of Defense, and they would have to have a conference and decide it?

General TRUDEAU. Right.

Mr. RIEHLMAN. Suppose they can't come to an agreement?

General TRUDEAU. Suppose in connection with NASA you had the equivalent of the old committee that met on NACA. Suppose NASA had three representatives, the Department of Defense had one (who would probably be the Secretary), the Army, Navy, and the Air Force each had one, the National Science Foundation had one, and the scientific adviser to the President was one. This is a pretty potent group of people, and they know what they are dealing with.

The scientist knows what his problems are in space and his capabilities, the military would present their side, they would be outnumbered as far as the civilians are concerned, and this is fine, nobody takes any exception to this, but a commission such as this, which would guide the work of Mr. Glennan——

Mr. RIEHLMAN. As I understand it, they had the final decision. Am I correct in that?

General TRUDEAU. Who does?

Mr. RIEHLMAN. The NACA.

General TRUDEAU. Dr. Glennan has the final decision.

Mr. RIEHLMAN. I am not talking about NASA. I am talking about NACA.

General TRUDEAU. Yes, sir; they set the pattern under which the Administrator operated. This is all fine to talk about the peaceful uses of space—and I agree with it, I think some day they will become terribly important, and I wish the pressure didn't exist now where

the survival of our country is at stake to a point where it is, but the importance of space today is for the defense of our country.

Mr. RIEHLMAN. We all recognize that, General, and we want to do everything we can to be helpful. That is why we are holding hearings, so that we can come up with the right kind of legislation and so we don't want to create a lot of overlapping commissions and committees that can't make decisions.

General TRUDEAU. Well, it is a very complicated problem. I don't know that I have helped you to resolve anything in your own minds, and I hope I haven't added to the confusion, but I have tried to give you one man's opinion, my personal opinion, I might say.

The CHAIRMAN. Mr. King.

Mr. KING. Exploring this a little further, I am sure you sense there are some of us who are concerned with the problem of whether there should be an overall man or agency, somebody who can finally resolve disputes between the Secretary of Defense and the Administrator of NASA.

Now let me pursue this: Suppose that NASA, in due course of time, gets ready to make a shot for the moon. This will be 8, 10, 12 years ahead, or whenever it happens to be. It has profound military implications, notwithstanding the fact that we are committed to the peaceful uses of outer space, and we would go forth waving the olive branch, of course, consistent with the spirit of peaceful exploration of space.

General TRUDEAU. Certainly.

Mr. KING. But nevertheless there would be military implications, particularly if the Russians had gotten to the moon before we did, which is possible, and maybe——

General TRUDEAU. It is likely.

Mr. KING. We could almost hear them rattling the sabers up there, then we would have to admit that our activity would have military significance. Now getting to my question: Suppose the military organization felt that certain things should be done, not to rattle the saber, but simply to protect ourselves, a purely defensive point of view. Certain things should be done with regard to this moon launching, but let's assume that NASA is not inclined to take those steps recommended by the military, and instead works out its strategy along different lines.

Now, my question is who solves that problem? Who has the final say-so?

General TRUDEAU. The Secretary of Defense should be able to go ahead. We can no longer afford to lose the kind of time that is being lost in this country. And if NASA disagreed with him, they could put their reclama into the White House, and if the White House overrode the Secretary of Defense, that would be one thing, otherwise the Secretary should proceed at all speed.

Mr. KING. Let me complicate it a little more. Suppose the whole project were enveloped in such secrecy that the military didn't know enough about it to be able to get its oar in, so that it would know whether these precautions were being taken or not?

General TRUDEAU. You mean if NASA didn't inform the military?

Mr. KING. Yes.

General TRUDEAU. This would be a most unhappy situation, but one that could occur.

The CHAIRMAN. Will the gentleman yield? Of course, if you had your military applications division in NASA, the military would know amout it, wouldn't you think so?

General TRUDEAU. We would hope so, but there is no assurance of that, the way some secrecies are kept today.

Mr. KING. The way this bill is drawn up at the present time, as I understand it—and I will ask you to comment—the hypothetical situation that I have described could become an eventuality. In other words, you could have a situation in which NASA is undertaking a project that has profound military significance, and the military might not know enough about it to be able to comment intelligently until it is too late, or if it knows enough about it, its comments would go unheeded?

General TRUDEAU. It is possible.

Mr. KING. Unless it got right up to the level of the President of the United States, and if he happened to be extremely preoccupied with other things, which is certainly a possibility with the speed at which things are happening, then you would have a vacuum, and the matter would never be resolved; it that correct?

General TRUDEAU. I certainly have the highest regard for Dr. Glennan's talents and his integrity, but in an organization that will probably exceed some 10,000 or 15,000 people, not all of whom would be in highly responsible positions, this could occur. We know this, we have seen subversion occur in the most unexpected places in our country, and at a terrible price, within the security of the atomic energy effort.

Mr. KING. I appreciate your comments. Let me join you in your expressions of confidence in Dr. Glennan. I share those confidences; I think the man is doing a tremendous job, but we may not always have Dr. Glennan. The scene shifts, and changes occur, and we are setting up the structure now which is to operate for many years to come. These problems concern me very greatly. I share your view that there are some very definite military implications in all that we do in space, and I think the military should not be jeopardized in any way because of this cleavage. That is the thing that is concerning me. That is all, Mr. Chairman.

The CHAIRMAN. The gentleman's time has expired.

Mr. Chenoweth?

Mr. CHENOWETH. General, I like your statement that after the Civilian-Military Liaison Committee has been abolished, that the necessity for informal liaison is obvious, and you assume this bill would not preclude such informal arrangements.

I don't think this committee, or Congress, is going to write everything in the bill, tell you what time of day you have to get together, or what sort of clothes you wear when you meet. There is some feeling that we have to write everything out in Congress. I don't think we can do that. You are reasonable people down there. There is no reason why you can't have these informal meetings continuously, is there. General? And I assume you are having them?

General TRUDEAU. They could exist only between scientists, in which the full implication of some action or failure to take some action would not reflect its military importance. This is a matter of concern. As I say, I have considerable faith, certainly, in Mr. Douglas and Dr. Glennan's intent to establish this—what do they call it—Activities

Coordinating Board, and this can have possibilities, it could be the solution. Whether it will go far enough and solve it is always open to question.

Now there is a willingness on the part of the Army—and I believe the Secretary will share my view in this—to try this, if this is considered by the committee and the Congress as the best that can be arranged, and then if next year the conditions prove that we haven't been correct in this assumption, then I imagine this bill will have to be rewritten again.

As a matter of fact, you will probably have to rewrite it every year for several years.

Mr. CHENOWETH. We are going ahead with our research and development program?

General TRUDEAU. Yes, sir; we are making progress.

Mr. CHENOWETH. You are the Director of Research and Development in the Army. How do you feel about the Army research and development program? Is that making substantial progress?

General TRUDEAU. We are making good progress. There are many other things we would like to do. This is only natural. If everyone were satisfied with their accomplishments they ought to be fired. We are not at all complacent about this. There are some things we would like to speed up in the way of fundings, getting decisions, and matters of this sort, but these are probably only the frustrations that are normal to big government and big operations. So, we are making progress, to answer your question.

Mr. CHENOWETH. You feel as both the Secretary of Defense and the Administrator of NASA do that this situation can be worked out so that decisions will be made more promptly, and you will be able to proceed with greater expedition?

General TRUDEAU. We view this as a very positive improvement over the old Civilian-Military Liaison Committee, which was completely ineffective, as I say. The decision whether you need to write it into the act is a decision of Congress.

Mr. CHENOWETH. You feel this is a step in the right direction, we are making progress?

General TRUDEAU. This is much better than the charter of the old committee.

Mr. CHENOWETH. That is all, Mr. Chairman, thank you.

The CHAIRMAN. Mr. McCormack.

Mr. MCCORMACK. The Civilian-Military Liaison Committee was not given a fair test, you understand that?

General TRUDEAU. I agree with you, Mr. McCormack.

Mr. MCCORMACK. Again, if understanding minds utilized that committee, it might have been very effective; is that correct?

General TRUDEAU. That is correct. It never had a chance.

Mr. MCCORMACK. Now, as I interpret your answers to the questions, your answers have been in the light of the world of today.

General TRUDEAU. That is correct.

Mr. MCCORMACK. The importance of preservation; is that correct?

General TRUDEAU. That is correct, sir.

Mr. MCCORMACK. Of course, we have got to have understanding minds in the solution of any problems involving defense and peacetime activities, but we are not at peace, are we?

General TRUDEAU. Not for my money.

Mr. MCCORMACK. I take it from what you say that you are somewhat disturbed, too, about the extent to which space can be utilized for military purposes?

General TRUDEAU. Yes, sir. I can see tremendous possibilities, and I want us to have that ability, and not the enemy.

Mr. MCCORMACK. Even in travel in the future; suppose some other country would want to interfere with Americans traveling in space, who would we look to to protect our rights?

General TRUDEAU. You would look to Defense.

Mr. MCCORMACK. The military?

General TRUDEAU. That is correct, sir.

Mr. MCCORMACK. The same as we do in the freedom of the seas; is that right?

General TRUDEAU. That is right, sir.

Mr. MCCORMACK. Now, coming to the provisions of this bill, on page 9—there are other parts of this bill of importance, but we have been more or less addressing our inquiries to this, at least I have, because of the importance in my mind of the preservation of this country, not only for myself, but for the next generation of Americans. I am thinking of the youngsters who are walking these streets, what kind of a life they are going to live.

That is page 9, section 309.

General TRUDEAU. All right.

Mr. MCCORMACK. The select committee put language in the bill that we thought went pretty far, as far as we could go from a legislative angle. We recognized the world of today and the importance of the military therein, but apparently there was some interpretation on the word "except," which, as chairman of the select committee, I certainly never intended in the broad manner in which it was interpreted.

Now coming to section 309, it says, "Nothing in this Act." That is negative, isn't it? That is a negative approach to protecting the military in this important field?

General TRUDEAU. Yes; it is negatively stated; that is correct.

Mr. MCCORMACK. What about the language, "The Department of Defense shall undertake such activities involving the utilization of space as may be necessary for the defense of the United States, including the development of weapons systems, utilizing space vehicles, and the conduct of research connected therewith"?

I don't like that word "supporting."

General TRUDEAU. Yes.

Mr. MCCORMACK. What would be your personal views on that language?

General TRUDEAU. It would be all right, except that the title of the act is addressed to NASA.

Mr. MCCORMACK. I know, but this is a bill, if it becomes a law——

General TRUDEAU. If that is felt necessary.

Mr. MCCORMACK. That would be affirmative, wouldn't it?

General TRUDEAU. Yes, sir. You know, a soldier always desires the affirmative approach, I guess.

Mr. MCCORMACK. Take paragraph (b). It says that "Any disputes"—I use the word "dispute"—"shall be assigned by the President

to NASA or Department of Defense." Of course, the President—there is no language we could write that could take away from the President his constitutional rights and powers.

General TRUDEAU. No.

Mr. MCCORMACK. No matter who the President is, whether as Chief Executive or as Commander in Chief, where he has tremendous emergency powers in time of war, for example.

General TRUDEAU. That is absolutely correct.

Mr. MCCORMACK. So that language is unnecessary, paragraph (b) is unnecessary, because we are simply reiterating in the bill something that exists under our Constitution, and, if we undertook to take it away, it wouldn't be constitutional; is that right?

General TRUDEAU. Of course, (b) is probably as necessary as (a) is, because the Secretary of the Department of Defense is charged with everything in the defense of the country.

Mr. MCCORMACK. I know. In the case of a dispute, the Secretary of Defense and the Administartor of NASA both have the right to go to the President on the question, if the President wanted to receive them, wouldn't they?

General TRUDEAU. That is right.

Mr. MCCORMACK. Do you see any necessity of that language?

General TRUDEAU. My legal training is restricted to a point where I would rather not comment, Mr. McCormack.

Mr. MCCORMACK. In any event, your personal opinion is that in the world of today you would rather have affirmative language regarding the jurisdiction of the Department of Defense, in connection with outer space, from a military angle and in the performance of military missions and those things leading up to it, wouldn't you?

General TRUDEAU. I would; yes, sir.

Mr. FULTON. Would you yield?

Mr. MCCORMACK. I would be very glad to yield, yes. I am just asking questions. My mind is not to be judged—you can judge my mind that I appreciate the importance of the world of today, and, as far as I am concerned, if I am going to err, I am going to err on the side of strength than on the side of weakness.

General TRUDEAU. This is a good decade to do that in, Mr. McCormack.

Mr. MCCORMACK. Do you want me to yield to you, Mr. Fulton?

Mr. FULTON. Yes. I think you have hit on some very excellent points. The points have gone much further than the jurisdiction of the Department of Defense. History repeats itself so much that it is amazing to see it happen right here in this room. For example, we have been through all this before when they are going to explore the new oceans and the new continents. It reminds me that in 1535 John Seldon, of England, wrote a book entitled "Mare Slausum Seu, Domino Maris," dominion of the seas, and Britain then took the position that she had to dominate the seas. And, of course, that led to the Spanish armada. There was a race to dominate the seas. Grotius wrote the book "De Mari Libero," freedom of the seas, a man from the Netherlands. Of course, you can see, with their strategic position, they needed freedom of the seas.

As we go into space we are faced with the two philosophies which you and the majority leader have been discussing, and they must be

put under the tent of a philosophy. Congress itself has said that the United States will proceed into space for peaceful purposes by peaceful means. I was delegate to the United Nations, serving under our Chief Delegate, Cabot Lodge, in the last General Assembly, the 14th, which ended in December, and there it was decided that all the nations of the United Nations—82 of them—would adopt a similar policy. That likewise has been the policy laid down in the President's messages to Congress on space.

The question is, then: Do you, in a philosophical sense, feel that since we are in this race, that the military must take the lead, and that our security is so important that instead of a peaceful approach to outer space, that it is so all-pervading that we must exert our power to control space backed by a military support? You see, there are two entirely different philosophies——

The CHAIRMAN. The gentleman's time has expired.

Mr. MCCORMACK. My time has expired, you mean. All right.

The CHAIRMAN. You may answer the question——

General TRUDEAU. Well, the facts of life——

Mr. FULTON. Just one moment, on the gavel, if you will, with respect to me, not bang the gavel, I would certainly appreciate it from here on. I can only ask for myself. But I can only hope from here on that the gavel will be used much less. If I am thinking something of a philosophic nature, I don't want to be awakened by a gavel. I am in outer space and I am brought right back——

The CHAIRMAN. The Chairman was awake.

Mr. FULTON. I would like to hear this.

Are you off jurisdiction and into a basic philosophy that is different? That is why I asked, Where does the colloquy between you and the majority leader end?

General TRUDEAU. I like noble sentiments.

Mr. MCCORMACK. He satisfied me. I understand his mind. I read the gentleman's mind enough to evaluate it. Now——

General TRUDEAU. I enjoy noble sentiments, and I try to read as much as I can of philosophy and high sentiments, such as these, in the evening. [Laughter.]

General TRUDEAU. But in the daytime I am affected by the practical side of life, and I can't forget that while I had a division on the Korean front and an armistice existed, that 6,000 Americans shed their blood.

The CHAIRMAN. Mr.——

Mr. FULTON. May we just finish with that?

The CHAIRMAN. The gentleman's time has expired. Mr. Anfuso?

Mr. FULTON. Would you yield?

The CHAIRMAN. You are 4 minutes overtime.

Mr. FULTON. Would you yield for that question?

The CHAIRMAN. Mr. Anfuso, will you yield to the gentleman your time for——

Mr. FULTON. Just for one question.

Mr. WOLF. I ask unanimous consent that the gentleman be permitted to continue for an additional 5 minutes.

The CHAIRMAN. You have heard the motion. But I can tell you this, that some of you are going to be cut off, because at 11:30 we must stop for the presentation of the movie.

Mr. ANFUSO. I ask unanimous consent that the gentleman proceed for 1 minute.

Mr. McCormack. The Chair doesn't have to entertain that; without objection he doesn't have to.

The Chairman. If there is no objection, the gentleman is going to be allowed 1 more minute, and after that we are going to move around to the other members.

Mr. Fulton. I don't want to be put in the position that I am taking time from other members, so that I will now pass the question and probably will leave.

Mr. Anfuso. You have the additional minute. Go ahead, Jim, you have the additional minute, go ahead, use it.

Mr. Bass. You have had twice as much as the rest of us.

Mr. Fulton. If it is on that basis, I yield back to you.

The Chairman. Mr. Anfuso is recognized.

Mr. Anfuso. I yield to the gentleman for a question.

Mr. Fulton. I would be very glad to have a question.

Which philosophy of those two do you espouse——

General Trudeau. Will you repeat that?

Mr. Fulton. Which of the two philosophies do you think we should espouse? How should the United States enter outer space? Should we do it for the purpose of security and have it race into space; that is, a military race into space for the control or the power to control space, on behalf of the United States and the Western World, or should we go in as the President has said, for peaceful purposes through peaceful means and use space for peaceful means?

It is a complete difference of philosophy. If you mean the latter, why, that is a different thing than what you and the majority leader were talking about.

Mr. McCormack. Don't try to read my mind. Your recollection reflects your own thoughts. I don't agree with you on what the General said. He is responding to the law of self-preservation.

General Trudeau. That is correct. As a soldier, my job is in the defense of the country.

Mr. McCormack. We are talking about two philosophies. What philosophy of government has the potential enemy got as compared with ours? That is involved here.

Mr. Fulton. That is no need for adopting the same one——

Mr. Anfuso. May I proceed now——

The Chairman. The gentleman yielded his time for a question. He may proceed now.

Mr. Anfuso. May I proceed now?

Mr. President—General, excuse me.

General Trudeau. I accept the demotion. [Laughter.]

Mr. Anfuso. I always confuse you with President Truman.

General Trudeau. I am glad that didn't come from the other side here. [Laughter.]

Mr. Anfuso. Now you stressed something about the importance of defense of our country, in which I am sure we all concur, and you spoke about this commission or committee. Where does Nike-Zeus fit into this situation? Do you think you might be restrained from the development of Nike-Zeus, which I regard as the most important thing that we have to develop today?

General Trudeau. We may be restrained. There are people that have doubts about Nike-Zeus, and the reason they have doubts is be-

cause they are attributing to the enemy a competency that we do not have ourselves, and apparently feel that in his capability he is going to be able to make greater advancement during the next 2 or 3 years while we are developing Zeus than we will make in Zeus, itself.

We don't agree with that. We think Nike-Zeus can do the job. We don't like to see the goalkeeper taken away from the goal just because somebody might get a puck or a ball through it. We don't believe that is good strategy in any game, particularly one for survival. We do believe Nike-Zeus has an inherent capability to perhaps have a limited antisatellite capability, and we do consider it as the third step of development, Nike-Ajax and Hercules being the first two, that will lead on to an antisatellite development which we think is very, very important for the future.

Mr. ANFUSO. General, I think you will concede that Russia today does not present a bomber fleet. She doesn't have a bomber force to any great extent.

General TRUDEAU. Limited.

Mr. ANFUSO. She has a very limited one, isn't that true?

General TRUDEAU. Limited.

Mr. ANFUSO. Isn't it true that we are today spending something like $250 million a year on bomber detection when there is no real menace, and wouldn't it be better if we emphasized using more money on the Nike-Zeus?

General TRUDEAU. Well, there still is a menace from the enemy fleet, whether they are one-way trips or whether they are refueled, and that can be given to you in other places in much more detail.

So it is still not the time and it will be a decade away before we get away from the aircraft threat.

Mr. ANFUSO. I agree with you. We should be thinking about using money for the Nike-Zeus. Doesn't that present the most important thing——

General TRUDEAU. We should have it as soon as we can, and let me say there are several other air defense programs in this country that cost more money in their day, although it wasn't all presented as a package, than the Nike-Zeus system will cost you. I know it is expensive, but this country is important.

Mr. ANFUSO. And assuming that we have some failures and we do spend money which at the beginning might appear to be wasted, we are gaining knowledge all the time, and eventually you have the confidence that we will achieve perfection in that, that we will have an antimissile missile.

General TRUDEAU. Nothing is perfect in life. This is always something to watch in the scientific approach, because these men think so brilliantly that sometimes they scare themselves to death. The soldier on the battlefield knows something doesn't work every time. We have to send soldiers out to fight even though we know one out of five is going to be a casualty. All these things have to be evaluated as risks. When we go into the development of Nike-Zeus, we are considering the risks of it to the defense of the country, along with such passive systems as we have in the civil defense, and move into it from that point.

The CHAIRMAN. Mr. Van Pelt?

Your time has expired, Mr. Anfuso.

Mr. ANFUSO. Thank you, General.

Mr. VAN PELT. General, isn't there a coordination and cooperation going on between NASA and the Defense Department at various levels today?

General TRUDEAU. Yes, there is.

Mr. VAN PELT. Is that proving reasonably satisfactory?

General TRUDEAU. I am not sure whether it is adequate or not, or whether it is eliminating, say, unprofitable duplication—and I want to qualify that word, because some duplication is profitable.

Mr. VAN PELT. Yes, I will certainly agree with that.

On page 9 of the bill, section (b), the thing that concerns me with the establishment of another council or something of that nature in section (b) here, we have:

> Whether intended for use by the Administration or the Department of Defense, or both, shall be assigned by the President to either the Administration or the Department of Defense.

It seems to me that from testimony that we have heard here and from informal discussions when we have been visiting some of our bases where research and development is going on, there has been a continuous complaint that there have been too many chiefs in changing the program, and it seems to me that we can't go much higher than the President.

General TRUDEAU. Well, we all know that these are the courteous and also the proper words to put in here, but it is doubtful in connection with any one booster or payload that the matter is ever going to come to the President's personal attention for decision.

We are also concerned that if the liaison is only between two scientists, say in Defense, and also in NASA, that the military opinions may not be reflected that are terribly important.

Mr. VAN PELT. Well, I would certainly want them reflected, because I agree with the majority leader, that if we are going to err in anything, that I want to see it on the side of defense.

Thank you, General.

General TRUDEAU. Thank you, sir.

The CHAIRMAN. Is the gentleman through?

Mr. VAN PELT. That is all.

The CHAIRMAN. Mr. Wolf?

Mr. WOLF. I think Mr. Hechler has a very important line of questioning. If it is all right, I would like to yield my time to him.

The CHAIRMAN. It is against the rules of the committee to yield your time.

Mr. HECHLER. Will the gentleman yield for one question?

Mr. WOLF. I yield.

The CHAIRMAN. You can yield for a question. That is as far as you can go under the rules of the committee.

Mr. HECHLER. General, the charter setting up the Civil-Military Liaison Committee states in very explicit terms, and I quote:

> The Committee—

the Civilian-Military Liaison Committee, that is—

> is authorized and directed to take such action and make such arrangements between the Department of Defense and the National Aeronautics and Space Administration as are necessary to perform the following functions—

one of which is—

investigate, define, and recommend courses of action where jurisdictional differences between the two agencies have arisen or might arise.

Also system transfer of projects and facilities between the two agencies, and so forth.

I can't understand how this proposed Activities Coordinating Board does anything that the CMLC didn't have the power to do. Isn't it just abolishing one committee and creating another one? Aren't you creating one that in a sense is worse, because it consists of the two representatives of the very agencies involved in the conflict?

General TRUDEAU. Well, I think the power was negated by the personalities that were in power at the time.

Mr. HECHLER. Why not get new personalities, then?

General TRUDEAU. Well, you can get new personalities, but as we say, "Are legislation, directives, policies procedures that are based only on the personalities of the moment adequate for the job?" This is one of the questions. But the clause on which I have put some faith in the Defense Department's intent to do more, anyhow, was in Mr. Douglas's inserting that there will continue to be a need for a high degree of cooperation and coordination between NASA and the Defense Department for "the solution of problems of mutual interest."

This may not be materially stronger than the words you have read, but if the real intent is there to implement it, then perhaps we can expect more out of the new plan than out of the old committee, which was zero. I am sure we will get more. You couldn't get less.

The CHAIRMAN. Will the gentleman yield for a further question?

Mr. WOLF. I would be happy to yield; yes, sir.

The CHAIRMAN. You yielded to Mr. Hechler.

Mr. WOLF. I would be glad to yield.

The CHAIRMAN. You are through, though? The Chair wants to recognize Mr. Fulton at this time. We have made the rounds of the committee and Mr. Fulton is disturbed over something that the general has said in reference to some of Mr. McCormack's statements. I am not concerned. I understand General Trudeau. He is a great American and he is vitally concerned with the defense of this country. General, you feel that this bill is an improvement, but you believe that we can as a committee, make further improvements in the bill?

General TRUDEAU. I am sure continued improvements can be made.

The CHAIRMAN. You are not here to advocate the military taking over completely all of space activities, are you?

General TRUDEAU. No, sir, I am not.

The CHAIRMAN. You are not here in defiance of the announced policies of this Congress and the administration that space fundamentally and essentially is a peacetime development?

General TRUDEAU. That is correct.

The CHAIRMAN. You want that policy to continue?

General TRUDEAU. And for the long range, that is right.

The CHAIRMAN. But you do not want the military to be left at the roadside, and the train go on with the developments, with the military not knowing what is happening? That is the reason I rather like the idea that was advanced here in the last few days, that we might establish a liaison committee similar to that which the Atomic Energy Commission has, and a military applications division in NASA. In

that way the military would have daily access to the developments of NASA, and would not have to rely on the outside agency—the Civilian-Military Liaison Committee.

General TRUDEAU. That is right, sir.

The CHAIRMAN. Don't you think that would give the military a great deal of advantage; by having such a division inside NASA, the interests of the military might be protected?

General TRUDEAU. It would materially strengthen it, yes, sir, in my opinion.

The CHAIRMAN. But then, again, you would be worried about the top level; when the two umpires got together, that is, the representative from NASA and the representative from the Defense Department, if they couldn't agree, a final decision would have to be made somewhere to speed up this program.

General TRUDEAU. That is right, it would have to be made.

Mr. WOLF. Would the Chairman yield?

The CHAIRMAN. All right.

Mr. WOLF. Who is going to make that decision? Who is that final authority?

General TRUDEAU. I told you my opinion, since the primary responsibility was to insure the defense of this country, the Secretary of Defense should be able to go ahead without delay on what he considers necessary in space. If it is not concurred in by Dr. Glennan, then Dr. Glennan should be able to reclama through the White House, and if the President decides to override the Secretary, all right, but let's not use a month or two staffing a paper—time is important.

The CHAIRMAN. You would certainly give the President the final authority.

General TRUDEAU. There is no question about that. I am sure in anything I have said I wouldn't want to imply that the President doesn't have the final authority.

The CHAIRMAN. We want to take some of the load off the President. Assuming Dr. Glennan and the Secretary of Defense couldn't get together on a specific problem, would you want the law to establish a third party to whom they would go before they address their grievances to the President? It just depends on how much work you want to take off the President. We put the President in this matter originally——

General TRUDEAU. I wouldn't, because you have got a third party now, and this is one of the assistants to the President who has this staff. He is your third party.

The CHAIRMAN. So you would go right straight to the President in any case of difference of opinion between NASA and the Defense Department, you would move right to the President?

General TRUDEAU. I would, as far as NASA is concerned. As far as the Secretary of Defense, I would go ahead and get my business done.

The CHAIRMAN. Well, we have to be fair, and we want harmonious relationships and we don't want NASA going down one road and the Defense Department going another road.

General TRUDEAU. When the relative degree of power and authority is spelled out, the personality clashes will disappear.

The CHAIRMAN. I think that is correct. I think the General has made an excellent witness. We think a great deal of you, General

Trudeau, because of the fine work that you have done, and we appreciate the fact that you are willing to come before this committee at all times to help. I believe I can voice the sentiments of all the members of the committee—they want to do all they can to push this space program onward.

General TRUDEAU. Thank you.

The CHAIRMAN. We want to thank you both for being here.

At this time we have a classified movie which is going to take about 30 minutes——

Mr. YEAGER. Twenty, Mr. Chairman.

The CHAIRMAN. It will take 20 minutes.

General TRUDEAU. If you desire to see it. It is entirely up to the committee.

The CHAIRMAN. If there is no objection, we will go into executive session to see the classified movie.

(Whereupon, at 11:28 a.m., the committee proceeded into executive session.)

TO AMEND THE NATIONAL AERONAUTICS AND SPACE ACT OF 1958

THURSDAY, MARCH 17, 1960

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND ASTRONAUTICS,
Washington, D.C.

The committee met at 10:20 a.m., Hon. Overton Brooks (chairman) presiding.

The CHAIRMAN. The committee will come to order.

This morning we are happy to have the Under Secretary of the Air Force, Dr. Joseph V. Charyk. Dr. Charyk has a prepared statement.

We especially appreciate Dr. Charyk coming here this morning.

We also have an old friend of the committee; not old in age, but old because of his many appearances before our committee, Lt. Gen. Bernard A. Schriever.

We are happy to have both of you here this morning.

I would like to say this: Since the presentation of the Air Force flag to the committee has taken some of our time, it might be wise, Mr. Secretary, if you proceed with your statement, and then General Schriever will make his statement. Following both statements, the committee will ask questions.

Secretary CHARYK. Very well, Mr. Chairman.

STATEMENT BY HON. JOSEPH V. CHARYK, UNDER SECRETARY OF THE AIR FORCE

Mr. Chairman and members of the committee, I am pleased to have the opportunity to appear before this committee once more and to discuss certain aspects of H.R. 9675, whose purpose is to introduce certain modifications in the National Aeronautics and Space Act of 1958. Lt. Gen. Bernard A. Schriever, who is now commander of the Air Research and Development Command, and who has played a key role in the Air Force's missile and space activities, is with me today and we will be happy to discuss with you the various aspects of this most important problem.

It is my opinion that the proposed amendments to the act are timely. The past 2 years have provided an excellent opportunity to measure the effectiveness and to ascertain some of the deficiencies in the original act. I believe that there has been much confusion and misunderstanding generated by the implied statutory concept of a single military and civilian space program. In my previous testimony before this committee, I endeavored to clarify some of the essential

differences between the considerations relative to a civilian space exploration program and the philosophy and motivations underlying the Defense Department's considerations of space activities in proper relation to, and in context with, the total defense problem. The amended act would serve to clarify this confusion. The proposed changes recognize that the concept of a single program embracing military as well as nonmilitary space activities is illusory and that the concept of such a civil-military program in an isolated sense is not reasonable. The amendments would place responsibility directly and unequivocally in the National Aeronautics and Space Agency for planning and managing a national program of civilian space activities, while recognizing that the military utilization of space, together with the research and development effort directed toward that end must be integral parts of the Nation's defense program and the responsibility of the Department of Defense.

The amended act would recognize the essential differences between civilian and military programs and would clearly delineate the respective areas of responsibility. Experience has indicated that liaison can best be effected by interchange at all working levels and that an attempt to funnel such liaison activities through a single committee or group of individuals serves only to stifle proper and complete interchange. I believe that it is necessary, however, to insure that a mechanism is available to resolve potential interactions in major areas, to insure complete information exchange and to avoid the development of major programs with significant duplicatory aspects. In order for such coordination to be effective, however, it is my personal opinion that the members of such a coordination board or committee must be individuals who have program and policy responsibility. I believe that an Activities Coordinating Board of the character suggested by Secretary Douglas would be an excellent mechanism for assuring adequate coordination at the appropriate levels.

I believe that section 309 of the proposed act serves to enunciate the responsibilities of the Department of Defense for the conduct of those activities deemed to be important to the national defense. I believe that it is important that there be no significant limitations placed on the Defense Department's activities which might adversely affect its ability to properly execute its responsibilities. It is our interpretation that section 309(a) insures that the Department of Defense is not precluded from undertaking any activities which are important to the national defense effort and that it is understood that these activities can and will include research, component and subsystem developments, the development of vehicles and, finally, the development of complete systems.

It will, of course, be necessary, as I have noted above to maintain a close relationship with National Aeronautics and Space Agency at policy levels to insure that undesirable duplicatory efforts are avoided. One of the most costly areas of development where it is essential to avoid wasteful duplication is that of booster and launch vehicle development. Section 309(b) serves to insure that there will not be duplication in this area and that either the administration or the Department of Defense, as determined by the President, can be charged with the responsibility for the development of a new launch vehicle. It is, of course, important to note that the intent here is to eliminate major

duplicatory activities and that there should be no attempt to place limitations on logical and necessary modifications of present space vehicles to exploit their maximum capabilities.

In summary, I believe that the passage of these amendments will be a positive and constructive aid to our national efforts in the space field.

Thank you.

The CHAIRMAN. Thank you very much, Mr. Secretary. We appreciate your very fine statement.

Now, General Schriever, will you proceed with your statement?

General SCHRIEVER. Yes, sir.

STATEMENT OF LT. GEN. BERNARD A. SCHRIEVER, COMMANDER, AIR RESEARCH AND DEVELOPMENT COMMAND

Mr. Chairman and members of the committee, I am grateful for the opportunity to again appear before this committee to discuss proposed amendments to the National Aeronautics and Space Act of 1958.

You will recall that when I appeared before your committee on February 5, of this year I stated that from a national point of view progress in space research and the exploitation of space is essential—both for our national security and our scientific and technological prestige.

In this connection, our military and civilian operations complement each other. Both must be pursued with imagination and vigor in the national interest. In such pursuit, close cooperation between the existing space agencies—primarily the Air Force, which now has responsibility for military booster development, systems integrations, and launching operations—and the National Aeronautics and Space Agency, which is responsible for civilian space boosters and other civilian space activities is not only desirable, but mandatory. Only by such cooperation can our Nation muster the best in the way of brains and facilities and utilize them to the fullest. This kind of cooperation does prevail today between the Air Force and the National Aeronautics and Space Agency.

Any sound consideration of our military and civilian space activities must give proper weight to their individual characteristics. The military and civilian missions in space and their attending requirements do not merge into a single image. There is a clear divergence—a divergence which becomes immediately apparent when the nature of the military and civilian space roles and systems are examined and compared. In my opinion, those who urge the establishment of a single monolithic space agency simply do not understand this difference.

This committee is aware that the basic distinction between the Department of Defense and the Space Agency is this: The primary responsibility of the Department of Defense in the exploitation of space is the defense of the United States. The primary purpose of the Space Agency is the investigation of space for scientific and other peaceful purposes.

Space for the military planner is a medium—not a product like an atomic bomb. It is a medium which promises a high potential for national defense that undoubtedly far exceeds the limited three-dimensional arena of land, sea, and air to which man has historically

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been confined. It, therefore, seems to me a matter of highest urgency that this Nation exploit to the fullest the exciting and challenging possibilities which space offers in strengthening our strategic position. This is particularly true in the areas of warning, communications, surveillance, and intelligence. In the interest of national survival the military must not be inhibited in its activities in exploiting the medium of space and in conducting the research and development in this medium necessary to discharging its basic responsibilities of defense and survivability.

The President in his message to the Congress on January 14, 1960, referring to the National Space Act, made it abundantly clear that the Department of Defense has—and must continue to have—the authority to conduct research and development work in space and on related systems and to utilize space for defense purposes and "nothing in the Act should derogate from that authority * * *."

As I interpret them, the amendments to the National Space Act of 1958 as proposed in H.R. 9675 will provide a clear authorization for the Department of Defense to conduct that research and development and system procurements in space which are necessary to the national defense.

I will be happy to answer any questions that the committee may wish to ask me.

Thank you.

The CHAIRMAN. Thank you very much, General, for a very fine statement.

Now, Mr. Secretary, may I ask a question or two?

Were you consulted in reference to the preparation of this measure, H.R. 9675?

Secretary CHARYK. Yes, sir. There were a number of discussions held involving representatives of the Department of Defense and the National Aeronautics and Space Administration relative to the proposed changes in the act.

The CHAIRMAN. You were in on those discussions?

Secretary CHARYK. I was in on many of the discussions, Mr. Chairman.

The CHAIRMAN. And you had a chance to suggest changes?

Secretary CHARYK. Yes, sir.

The CHAIRMAN. Was General Schriever in on those discussions, too? General Schriever, were you in on those discussions?

General SCHRIEVER. I was not in on all the discussions of Dr. Charyk, but I was in on a number of discussions and was asked to comment on the act by the Air Force.

The CHAIRMAN. So that you had a chance to offer suggestions as to the language of the bill?

General SCHRIEVER. That is true.

The CHAIRMAN. Both of you gentlemen say that space is so vital that the use of it is going to be needed by the military in defense of our country.

We are now considering a bill which has reference to the National Aeronautics and Space Administration, a successor to NACA. Now, NACA functioned very well with the Air Force, didn't it?

Secretary CHARYK. The relationships were very fine.

The CHAIRMAN. I was on the Armed Services Committee during that time, and I knew about the activities of the Air Force with NACA. The relationships were excellent. You got good results from NACA, didn't you?

Secretary CHARYK. The results were excellent.

The CHAIRMAN. Now, if that is the case, why could not the same cordial and productive relationship be established with NASA? Is there any reason why that should not be?

Secretary CHARYK. Well, I might make two comments, Mr. Chairman.

In the first place, I think it is fair to say that the character of the Space Administration is quite different from the character of the NACA. On the other hand, I think it is also fair to say that our relationships with the new organization have been most satisfactory and continue to be very satisfactory.

The CHAIRMAN. Let me ask you this: You say your relations have been very satisfactory with NASA. Have they done anything in NASA which in your judgment has slowed down the defense program to any extent, or to put it another way, has NASA impeded the efforts of the defense program to any extent?

Secretary CHARYK. I can think of no specific case where that would be true.

The CHAIRMAN. Would you say the same, General Schriever?

General SCHRIEVER. Yes, sir; I would.

The CHAIRMAN. That your relationships with NASA are such that nothing has been done which has slowed down defense efforts or any objective that the Air Force has had to any extent at all?

Secretary CHARYK. I would say so.

(General Schriever nods.)

The CHAIRMAN. What would you think of the proposal that has been made that we establish in NASA an organization called, we might say, the Military Applications Division, to be staffed with military men, or at least with men with whom you would have intimate contact? They might be civilians.

Secretary CHARYK. Well, I will make a few initial comments, and I am sure that General Schriever may want to augment my statement.

I would think that this would be a very undesirable development. I believe that the philosophy and the motivations underlying Department of Defense programs, the urgency with which we have to approach certain activities are such that if we were forced to work through a mechanism of the type suggested I feel rather strongly that this would have a significant impeding effect on the developments that we think are important to the national defense effort.

The CHAIRMAN. Let me ask you, then, Mr. Secretary: What effect did this type of arrangement have on your relationships with the Atomic Energy Commission?

Secretary CHARYK. Well, I think——

The CHAIRMAN. Did it impede your operations?

Secretary CHARYK. I think that the problem is quite different there, Mr. Chairman, in that as General Schriever has pointed out, space is a new medium that has been opened up that not only has an important scientific potential, but also the exploitation of this medium can permit the accomplishment of important military tasks that could not

previously be undertaken; furthermore it permits tasks to be undertaken that can accomplish other military objectives in a superior fashion.

The CHAIRMAN. Would you not say the same thing with respect to atomic power?

Secretary CHARYK. I think in the case of atomic energy the situation is quite distinct in that the problem is quite separable in terms of warhead development versus the development of weapons systems that will actually use the warheads. It is more in the nature of a developer and a user, whereas in the case of space we are not talking about a product but we are talking about a medium.

The CHAIRMAN. Mr. Fulton?

Mr. FULTON. The question comes up, when we have had good experience with NACA, which utilized a committee-type of policy direction, why are we raising the question with regard to NASA; that is, whether the Space Council should be continued? These amendments, as you know, recommend the elimination of the Space Council.

What is there in the organizational structure of those two setups that is different, giving us one result in the case of NACA, a very successful result, but in NASA a questionable result?

Secretary CHARYK. Actually, I think NACA could have been characterized as basically a research organization. The NASA, on the other hand, is charged with significant development responsibilities. So I think that there is a rather important difference in the character of the two organizations.

Mr. FULTON. Should we divide the responsibilities of NASA into two, one research and development, and the other exploration or, I should say, operations?

Secretary CHARYK. Well, actually, I believe, Mr. Fulton, their organizational arrangement reflects that idea. They have organized themselves into divisions which, by and large, are divided along the lines that you have suggested.

Mr. FULTON. Well, as you know, under old NACA, they had the airframes, engines, propellants divisions, things of that type. Why couldn't we set it up so that a policy committee, upon which you people would have representation, would advise NASA?

Secretary CHARYK. Their research activities which have carried over from the old NACA organization are actually one element in their total organization. They are set up that way. Their other divisions are geared to the execution of their new responsibility, namely, the scientific exploration of space. I think it is important that we keep in close contact with them on both counts, that is, with respect to the aeronautical research activities, which constitute the traditional relationship, as well as with respect to their new responsibilities for the development of vehicles, payloads, and so on, for the scientific exploration of space.

Mr. FULTON. My question is simply this: Should this committee go back to the old NACA form of policy committee organization, or should we adopt the form recommended in these amendments, and cancel out the Space Council and then set up the kind of informal liaison between the DOD and NASA which has been recommended here, with each side just having people meeting together as the need arises?

For example, the DOD, with its particular responsibility with regard to airpower would have its people from the Air Force meeting with the NASA people who are directly connected with aeronautics. Which system would you favor?

Secretary CHARYK. I feel that the arrangement which was suggested by Secretary Douglas would be most effective, namely, setting up a so-called Activities Coordinating Board. The prime difference between this type of board and the other committees that we have had is that the people who would be members of this board would actually be the people who would have the program and the policy responsibility in both organizations.

The decisions that would be made by this board, therefore, could be immediately implemented since the representation on the board would consist of people who are charged with the execution responsibilities for specific tasks.

Mr. FULTON. May I just stop you there, because I don't want the time to run out. I did not understand that the board was to make policy decisions which were then to be implemented in either NASA or DOD. That, to me, would be putting another echelon above Mr. Gates, a Cabinet officer, between him and the President, I feel that the decisionmaking power should not be in this board, but that the board should be merely advisory and that the mechanics of judgment and administration should remain in the heads of both NASA and DOD, just as is now the case. My final question is this: With regard to liaison, wouldn't you recommend that the present liaison between Atomic Energy and the Department of Defense continue, and if you would, why wouldn't you recommend that an Atomic Energy-type liaison be set up with NASA? That is all.

Secretary CHARYK. Well, in regard to the first point, Mr. Fulton, relating to the character of the board, it is of course technically correct that the board would actually not make decisions. On the other hand, the people that would be represented on the board would be the individuals who have program responsibilities, so that if an agreement were reached, the implementation of that agreement would be simple and straightforward.

This would not in any way diminish the contacts at all levels that have been working, I believe, rather successfully between the two organization. I feel that if we endeavor to set up a formal liaison body through which interaction would have to flow, that this would in fact be a restrictive funnel on the interchange of information between the two organizations.

Mr. FULTON. So you oppose even the Atomic Energy-type of liaison between NASA and the Department of Defense?

Secretary CHARYK. I think it is not necessary in this case, and would actually hamper our interrelationships.

Mr. FULTON. Thank you. That is all.

The CHAIRMAN. Mr. Teague?

Mr. TEAGUE. I have no questions, Mr. Chairman.

The CHAIRMAN. Mr. McDonough?

Mr. MCDONOUGH. I would like to know from both of you if you believe that the bill that we are considering provides a medium for resolving potential differences of opinion between DOD and NASA, in the development of space activities.

Of course, as I stated to a previous witness, the objective of this committee is to write legislation that will bring about the greatest amount of efficiency, and reduce duplication to a minimum.

Now, the organization which we establish should be of such nature that no differences of opinion will result, but there will be complete cooperation, from one agency to another.

Shooting a satellite into orbit, whether it is primarily for a military or peaceful purpose, probably will be of interest to both NASA and Defense. We don't want to set up any unnecessary liaison organizations that will just add a little more redtape to the accomplishment of your mission, and further complicate your problem when it comes to launching an ICBM or a satellite into space. There should be no doubt as to who is going to turn this valve, or who is going to shoot the satellite, or when is it going into space, or what it is going there for.

Do you believe that this bill will reduce to a minimum such problems?

Secretary CHARYK. I am confident that the legislation as proposed would greatly reduce the potential problems, and I think that although it probably would not eliminate all differences, even some major differences, I would think that it would limit the number of such differences to a minimum.

Mr. MCDONOUGH. What do you think, General Schriever?

General SCHRIEVER. Yes, sir; I agree with the Secretary on that.

Mr. MCDONOUGH. While you are here, and since you are directly responsible in part for the research and development in our military ICBM program, what have you learned from the shots that have failed?

General SCHRIEVER. Well, I think from a technical standpoint, of course, we learned from every shot where there is a failure, because these are highly instrumented and we, almost without exception, can determine exactly what happened and correct it.

Now, of course, we attempt to do the maximum amount of testing on the ground, simulating flight conditions, but as you can see, you can't simulate all flight conditions on the ground, either in terms of the environment or in terms of the type of forces that are imposed on the system.

So you have to flight test, and often you get a failure in flight which you haven't been able to get around to in your ground testing.

Mr. MCDONOUGH. Have you found that errors that have occurred in previous shots have not been duplicated in later shots? Have you been able to remove errors completely?

General SCHRIEVER. I couldn't categorically say that we have never had an error repeat, but we have for the most part removed the error that occurred. And, for example, in the Atlas program, we had an error repeat, but it was between one and the fifth shot later. We made a fix on that, and we have never had a failure of that kind again.

Mr. MCDONOUGH. Where has your greatest weakness been? In the fuel problem or in the guidance problem?

General SCHRIEVER. Our biggest problem has been associated with the components, we call it the "plumbing," associated with the rocket engine. We have had extremely good, reliable performance from our rockets, but there are a lot of valves, there are a lot of regulators.

These operate under extreme conditions, and we have had most of our problems in this area.

Mr. McDONOUGH. So it is a mechanical problem—that is a mechanical problem?

General SCHRIEVER. It has been mechanical. We have had no fundamental difficulties at all in any of our systems.

Mr. McDONOUGH. Are you convinced we have complete security on all of these systems? Do you think there has been sabotage in connection with any of these shots?

General SCHRIEVER. We have often suspected it, we have checked into it, but we have never been able yet to ascertain that we have had sabotage in any of our failures.

The CHAIRMAN. Mr. Anfuso?

Mr. ANFUSO. Mr. Secretary and General Schriever, I congratulate both of you on the very concise statements you have made. They are clear statements of your respective positions, I am sure. As you understand, we are considering rewriting this act so that it will make possible the most effective scientific research. I think that you will appreciate the fact that this committee has both the right and the duty to look into all space research, whether it is military or for peaceful purposes.

Now, I want you to bear that in mind, as I try to explore certain ideas. We have heard some testimony to the effect that the way the act is to be amended would separate Defense from NASA.

I appreciate the fact that that is a good thing, because I think that the Defense Department should not be restricted in any way in conducting research for military purposes and for the defense of our country. At the same time, NASA should do everything that it can in scientific research which concerns both the military and peaceful uses of space.

Now, there has been testimony that there are some guarded secrets. Sometimes the Defense Department has special projects, and secrets connected with them are pretty well guarded. That may be true of NASA as well. I think that in the best interests of the United States there should be some kind of a board, a review board, it could even be this Activities Coordinating Board that you speak of, to see that both agencies are getting the best results by an effective exchange of information.

For example, if the Department of Defense is exploring something of a military nature which could have a peaceful use, I think that the NASA people should know about it; and if NASA is exploring something of a peaceful nature which has military application, I think that you people in the Defense Department should know about it.

So, perhaps we ought to have a section in the law which will define the activities of this Activities Coordinating Board that you speak of. I think that such a Board should have representatives from the Army, the Navy, and the Air Force, and there should be three corresponding representatives from NASA; one, for example, who will be attached to the Army and who will see what Army is doing, another one attached to Navy, and still another one attached to the Air Force.

So that these six men will know what the various agencies of our Government are actually doing in the field of research. They would determine whether such research can be used by the military or for peaceful purposes.

I would also say something about the suggestion made by Mr. Fulton, my distinguished colleague from Pennsylvania. Perhaps there should be a member of the Atomic Energy Commission on such a Board, because after all, this committee is concerned with all space research, including atomic energy. I would like to have you give some serious thought to that, assuming you are not prepared to give us a full explanation of your views at this time. Would you prepare a statement of your views for us? As I see it, the function of this Board would not be criticism, it is not intended for that purpose at all. But the six or seven members of the Board should know everything that is going on, both in the Defense Department and in NASA, and then see that the best uses are derived from the results of all research, both for peaceful purposes and military purposes. Do you see what I am getting at?

The CHAIRMAN. The gentleman's time has expired.

Mr. ANFUSO. Will you prepare that for me, Mr. Secretary?

Secretary CHARYK. I could make a brief comment and then perhaps augment later.

I think that the objectives that you have indicated are unquestionably desirable. I have some reservations about an attempt at this stage of the game to formalize the character of the board. I think that it is important that there be considerable flexibility because I am sure that new problem areas will arise, other problem areas will be completely resolved and will not require intense effort on the part of the board.

So I think that it would be important to preserve considerable flexibility rather than attempt to rigidly spell out the composition and the character of the board.

Mr. ANFUSO. Let me have a statement on that, will you?

(The information requested is as follows:)

I would view the Activities Coordinating Board to be composed of individuals having program and policy responsibilities in NASA and in the Department of Defense. I believe that it would be appropriate for the Deputy Administrator of NASA and the Director of Defense Research and Engineering to act as co-chairmen of such a board. The additional representation on the board could, in my opinion, consist of individuals with program responsibility selected from either the Department of Defense or NASA, who would be the chairmen of the various subgroups which might be established to cover the areas of mutual interest, as well as potential areas of interaction.

Obviously, one of these subgroups would concern itself with the vehicle booster question. The chairman in this particular case would logically be either from NASA or from the Department of the Air Force, since this Department has been assigned the sole responsibility for all military space booster systems. Appropriate representation following the principles of membership noted would, in the former case, be the Director of Launch Vehicle Development of NASA, and in the latter case probably the Assistant Secretary of the Air Force, Research and Development.

Other areas where subgroups would probably be desirable would be range support, operations, and requirements; aeronautics; aerospace medicine. In each case the chairman of the subgroup would automatically be a member of the board. It is important, I believe, that these chairmen be, in fact, the individuals charged with responsibility for their area of activity in DOD or in NASA. I think it is important that the composition of the board remain flexible in that as time proceeds I would anticipate that new subgroups might be created and it might not be necessary to continue in existence some of the early subgroups. It might also be desirable initially to include subgroup vice chairmen as board members, although it is important that the board remain relatively small.

Accordingly, I feel it is necessary to insure that flexibility in the composition and mode of operation of the board be preserved. I would doubt, therefore, that there would be merit in establishing such a board in the proposed legislation, although if the language were written in such a fashion as to preserve this flexibility it would probably not be objectionable.

I believe that such a board would insure that proper and complete communication channels were perserved at all levels and that it would provide a ready mechanism for long-range policy considerations and for deliberations on items of interaction, joint interest and combined activities. In a minority of cases, it is likely that it would be necessary to refer differences to the Secretary of Defense and to the Administrator and, in extreme cases, a final resolution might, of course, have to be made by the President. However, our experience to date would suggest that the overwhelming majority of problems can easily be resolved by proper consideration by individuals at the levels which would be represented on the board.

I am confident that such a board would be effective and efficient and would achieve the proper coordination and integration that we all agree is necessary.

The CHAIRMAN. Mr. Chenoweth?

Mr. CHENOWETH. Mr. Secretary and General Schriever, I want to join in complimenting you on two very splendid statements, so far as I am personally concerned, very persuasive statements.

General Schriever, since you have the responsibility for the air research and development program, do you feel now that this legislation which we are considering will best enable you to discharge the responsibilities which you have, as commander of that research and development program for the Air Force?

General SCHRIEVER. Yes, sir. The way I read the intent of the legislation it certainly does.

Mr. CHENOWETH. You feel it would be a mistake to go to one agency? We need civilian research and development under NASA and Defense research and development under the Air Force and Army and Navy, as we have it now.

General SCHRIEVER. I definitely think it would be a mistake.

Mr. CHENOWETH. You feel this bill would accomplish the best results?

General SCHRIEVER. Yes, sir.

Mr. CHENOWETH. Can you tell me approximately what you are going to spend for research during the next fiscal year, just roughly, in round figures?

General SCHRIEVER. It is a little bit hard to answer. The total budget that we get for the Research and Development Command is a little over a billion dollars, but this is also including, of course, the operating and maintenance costs of the facilities that we have engaged in research and development, and of course there is some research and development that is associated with production. But the R. & D. Command has about $1.1 billion available to it.

Mr. CHENOWETH. We authorized $915 million last week for NASA. You feel it would be a mistake to try to impose that upon the Defense Department? Let NASA take care of its civilian explorations and let the Defense Department handle what is necessary for the immediate defense program? Is that your thinking on this subject?

General SCHRIEVER. Yes, sir. I think that there has been a considerable amount of thinking that the two programs are essentially the same. I think there is a great deal of divergence between the civilian program and the military program. I could go into detail on this if you like.

Mr. CHENOWETH. You state that they complement each other.

General SCHRIEVER. They complement each other. Of course, one of the reasons there is such a belief that they are one and the same is that it has been necessary to use the military resources for space application because those were the only resources available. But as we go down the line into the future, there will be a greater and greater divergence, in my opinion, between the civilian and peaceful scientific exploration of space and the military applications.

Mr. CHENOWETH. I am sure——

The CHAIRMAN. Will the gentleman yield? But you have always drawn on the results of research by NASA?

General SCHRIEVER. Yes, sir. There will always be an overlap because the sciences are the same, but the applications will be quite different.

Mr. CHENOWETH. Can't you have full cooperation between the military and civilian agency here without some board, council, or agency superimposed upon the two? Can't the Secretary of Defense and Administrator get together and through their very excellent staffs work out these different problems?

General SCHRIEVER. I don't think there is any question about it. Because—of course, we had to go through a learning period. NASA was a new organization, was given a new job: The Director of Research and Engineering was a new office in the Department of Defense. We have learned a great deal in the past year. I think there is no doubt as far as I am concerned, we are getting along extremely well with NASA today. We have military officers that are assigned to NASA, we have established arrangements for coordination. I, for one, think that we can get along extremely well together.

Mr. CHENOWETH. I am very happy to get that report, and I am sure that is correct. Just one other question; that is, concerning the military booster development.

General SCHRIEVER. Yes, sir.

Mr. CHENOWETH. Now, we hear a great deal about the alleged superiority of the Russians in the matter of boosters. NASA now has the responsibility of Saturn, to develop a 1,500,000-pound-thrust engine. What are your immediate objectives in the military defense booster program?

General SCHRIEVER. Well, our immediate objective——

Mr. CHENOWETH. How will that compare, correlate with NASA's efforts?

General SCHRIEVER. The only thing we can say at the moment with respect to a booster of that size is that it has potential military application. We do not at the present time have a specific requirement for a booster of that size.

Mr. CHENOWETH. You are not working on anything anywhere near that size?

General SCHRIEVER. No, sir.

Mr. CHENOWETH. Because you have no immediate need for it?

General SCHRIEVER. We have no immediate need for it. Our job is to really exploit the developments that have already occurred in the space field, and we are doing that in the form of our surveillance, our reconnaissance, our communications type of satellites which are essentially shallow or low satellites.

The NASA has a requirement for a large booster to get deep into space, to get larger payloads into space. Eventually I am sure we will have a requirement, militarily, for such a booster, too, but today we do not have one.

Mr. CHENOWETH. Is our present booster program adequate and sufficient to meet our present needs?

General SCHRIEVER. As far as the military booster program is concerned, it is adequate. And here is another point with respect to the military: We are interested in relatively large numbers of satellites, carrying the same types of payloads, because we want to get reliability, we want to get long operation from our payloads. The fact that we are interested in numbers means that we want to get simplicity and lower cost per launch.

I think you can look at the Soviet program: They have launched five space vehicles since 1957. We will be launching perhaps several hundred vehicles in one year for military purposes. The direction is quite different between the military and——

Mr. CHENOWETH. One final question——

The CHAIRMAN. Mr. Sisk—if it is a short question, go ahead.

Mr. CHENOWETH. Just this: It has been stated that except for the element of thrust in the booster program, that we are at least equal or perhaps we excel the Russians in the whole space and satellite program. What would your observation be on that contention, General?

General SCHRIEVER. I would say that except for the higher thrust available to the Soviet Union, that I, for one, believe that we are at least equal to them and perhaps even ahead. We have had some very significant experimental shots, this last one, I think, is a very outstanding one.

Mr. CHENOWETH. Thank you very much.

The CHAIRMAN. Mr. Sisk?

Mr. SISK. Mr. Secretary; General Schiever, I want to explore with you briefly proposed section 309, and I would like to refer you to that as background for a question. Based on testimony we have had before this committee, it would appear that we had a very successful marriage between NACA and DOD, and then due to certain events that happened late in 1957, the Congress and the executive branch, working together, went through a "divorce court" so to speak, and now it seems to me that due to the insecurity of certain of the offspring, we would like to have a remarriage here. I feel that this remarriage is very important to the security of these offspring, and the problems with which we are concerned.

Now, first I would like to ask you General Schriever, about this proposed section 309. Now, Mr. McCormack questioned General Trudeau—I don't know whether you have seen that testimony or not—regarding the wording of proposed section 309. I want to ask you, do you feel that all this language is necessary? First, with reference to subsection a of section 309, and then I want to discuss subsections b and d.

Now, I wonder if you would comment briefly? First, on subsection a of section 309; is there a need for all that language, or would you recommend striking out any of it?

General SCHRIEVER. Let me first say that I think one of the problems we had with the existing law is that it is unclear as to what the

Defense Department's responsibility in space really is. I think this bill clarifies that.

The wording in 309(a), I, myself, personally, would change only for clarity purposes, because I think the intent is certainly there. But it could be clarified, in my opinion, by deleting:

including the development of weapons systems utilizing space vehicles and the conduct of supporting research and research connected therewith.

Mr. SISK. Strike that out?

General SCHRIEVER. To strike out, but I want to substitute something which actually comes right out of the President's message to Congress. After the word "space" in line 8, I would substitute "and the research and development effort toward that end."

This comes right out of the President's message to the Congress, on page 2 of the message which, in fact, states

The military utilization of space and the research and development effort directed toward that end are integral parts of the total defense program of the United States.

And I think this is very clear language.

Mr. SISK. That would make subsection a read:

Nothing in this act shall preclude the Department of Defense from undertaking such activities involving the utilization of space.

General SCHRIEVER. Well, "the utilization of" is also superfluous, in my opinion.

Mr. SISK. You would strike that and make it read "from undertaking such activities in space and research and development effort toward that end"?

General SCHRIEVER. Such activities involving space and the research and development effort toward that end.

Mr. SISK. You think that would clarify it, then?

General SCHRIEVER. As may be necessary for the defense of the United States, period. Well, I am not a lawyer, but this would clarify it to me.

Mr. SISK. Now, with reference to subsection (b), I have such limited time here to discuss this, what is your opinion on the material in subsection (b) of section 309? Do you feel that is needed?

General SCHRIEVER. Well, I think it probably is—is a good thing to have in the bill, yes, sir. There was one question that we had, or I have, where it says "for the development of each new vehicle." Sometimes the definition of "new" might include just a modification or simplification, or something that I change and call it new. I would insert the words, perhaps, "basically new," which would then be—you could understand that you are talking about a new booster development, and not just a modification.

Mr. ANFUSO. Would you yield?

How about "any launch vehicle"?

The CHAIRMAN. It could be brand new.

General SCHRIEVER. Well, brand new, you could use that word. You get what I mean.

Mr. ANFUSO. Don't use the word "new"?

General SCHRIEVER. We have, for example, made a lot of modifications to our engine for the Atlas program, for example. The Agena, which is the second stage for the Discoverer program, has an

Agenda A and B, and it is the same engine but it has a longer tank; is that a new vehicle or not?

Mr. McDONOUGH. Specifically new.

General SCHRIEVER. A word of this kind would, I think, at least make it clear that you are talking about a new development program.

The CHAIRMAN. Mr. Van Pelt?

Mr. SISK. Mr. Chairman, I thought I had yielded. I thought some of you people used some of my time.

The CHAIRMAN. They took it away from you.

Mr. SISK. Could I have just one more question?

The CHAIRMAN. Make it short.

Mr. SISK. All right.

Would you comment on subsection d of section 309? Do you feel that is necessary? There are many other questions I would like to ask, Mr. Chairman.

The CHAIRMAN. The Chair feels the same way. But we must try to get around to everybody.

General SCHRIEVER. Well, of course, I think the President would do this anyway.

Mr. SISK. That is the answer I expected.

Thank you, Mr. Chairman.

The CHAIRMAN. Mr. Van Pelt?

Mr. VAN PELT. No questions.

The CHAIRMAN. Mr. Quigley.

Mr. QUIGLEY. It is with regret that even on St. Patrick's Day I have to be the devil's advocate.

General, in your statement you said that you thought cooperation between DOD and NASA was not only desirable but essential. Cooperation is mandatory. Aren't those terms almost contradictory? How can anybody, including the Congress of the United States or the President of the United States, mandate cooperation?

General SCHRIEVER. I didn't imply that you should write a law which says it is mandatory, no, sir. You can't.

Mr. QUIGLEY. These provisions come pretty close to that, I think. We are being asked to write a law to make cooperation mandatory.

General SCHRIEVER. No, sir. I would think that this is not required. I think that section (b) of 309 is adequate, and I can assure you, based on my experience in working with NASA, that we do cooperate and we will cooperate, because we want to.

Mr. QUIGLEY. Well, if that is true, then why are we being asked to change the law? If there has been so much cooperation and coordination, why can't we just go along with the law as it was written 18 months ago?

General SCHRIEVER. Well, No. 1, I don't think it is necessary to have a space council, such as you have at the present time. I don't think the liaison committee is very effective, nor could it be effective under the terms of the present law. The effective cooperation or coordination between agencies really has to be between the people who have policy and program responsibility. We have, in fact, been establishing that over the past year, and I have a number of examples that I could give you of this very thing.

One example is that we have a launch utilization committee, made up of two people, Colonel O'Neill from the Ballistic Missiles Division, and Mr. Rosen, from NASA——

Mr. QUIGLEY. I don't like to cut you off, but my time is short. I am not denying there have been many instances of splendid cooperation between the Air Force and NASA, but there also have been some glaring instances of lack of cooperation. Now, this is the problem facing the Congress. What do we do when the cooperation and coordination that we all hope would be there without any act of Congress just doesn't exist? What do we do then?

General SCHRIEVER. I don't know of any glaring cases. I think—I pointed out there is a learning curve you go through. We set up a new director in DOD, NASA was a new organization. I for one think we tend to sometimes go overboard in this country on trying to reduce duplication. I think one of our problems, our main problems in the country is to get so that we can get a decision made. We keep putting on one structure after another to reduce duplication. I don't know of any duplication right now between NASA and the military, I really don't.

Mr. QUIGLEY. Well, I want you to come to the basic point, the decisionmaking process. Who is going to make the decision when the cooperation and coordination breaks down?

General SCHRIEVER. Well, if the cooperation—it is a hypothetical case——

Mr. QUIGLEY. Well, perhaps the Air Force wasn't involved, but I can think of an awful lot of manhours that have been squandered in this Government and in this Congress over the fate or the Von Braun team—whether it is going to be in the Army or someplace else. I could go into a lot of detail on Agena–B. Without getting into specifics, there have been in the past, and I think we would be foolish to believe that there won't be in the future, instances where honest men have reasonable and deep differences as to what might be the most important thing to do and how it should be done.

General SCHRIEVER. Yes.

Mr. QUIGLEY. Now, how can we, by act of Congress, set up a foolproof system whereby, when those instances occur, they can be resolved and will be resolved by a person qualified and competent to make the decision?

General SCHRIEVER. Well, I don't think you are going to run into many problems like this. We have had a shakedown over the past year and a half or 2 years in the space field, and there have been differences of opinion. But you had ARPA, which was established in the Defense Department to run space programs. These have been, in large part, assigned to the services. And the rest of them will be.

You have established a Director of Research and Engineering, ABMA is being assigned to NASA. I think a lot of decisions have been made which, in my opinion, have been the right decisions, and I think that we have come a long way in straightening out a lot of the things that people have had differences on, and I think—I don't think there is going to be any lack of cooperation between the military and the NASA, I really don't.

Mr. QUIGLEY. Well, the thing that bothers me is that Dr. Glennan has aptly described the bill before us. He said it would clarify the confusion. I don't think it will cure it, I think it will just clarify it. [Laughter.]

General SCHRIEVER. Well, at the moment I am not confused about the military program nor am I confused about what our long-term

development objectives are, and they have direct and specific applications to the national defense. And I feel that under the provisions of this bill that we will be able to carry out those programs, and I think we will carry them out without duplication, with NASA, and in cooperation with NASA.

Mr. QUIGLEY. General, just let me make this one final point: Obviously, you have some pretty definite ideas as to what is the military objective and purpose in space, and I am assuming that Dr. Glennan has some very definite ideas as to what NASA's function is or should be, and your successor in office and his successor in office are going to have their own ideas.

I just don't see how to avoid conflict in some of these ideas. And when they do conflict, I think it is in the national interest that they be resolved quickly and wisely.

The CHAIRMAN. Mr. Riehlman.

General SCHRIEVER. I agree with you, but I think there won't be many of them, and I think that the President has to make the decision in this case.

Mr. QUIGLEY. This doesn't guarantee the wise or quick decision that I am looking for.

Mr. RIEHLMAN. Mr. Secretary and General, I think both of you have expressed your views in respect to the suggestion made by Mr. Douglas to set up the committee of coordination, knowing that this bill would eliminate the Civilian-Military Liaison Committee. I would like to have you explain, if you can, and as quickly as possible, how you feel that a Committee such as recommended by Mr. Douglas will be more effective than the Civilian-Military Liaison Committee that we now have. Would it have more authority to bring about better coordination and liaison between the Defense Department and NASA? Wherein would lie the benefit from the change?

Secretary CHARYK. Concisely, Mr. Riehlman, I think the major difference and a very fundamental and important difference is the fact that the proposed board would be constituted of individuals who have program and policy responsibility. The CMLC was really a third party to the problem. As such, it could not be expected to work in an intimate, effective, expeditious fashion.

Mr. RIEHLMAN. But they would be working at all different levels within NASA and within the Department of Defense, am I correct in that?

Secretary CHARYK. The liaison or the interaction at all levels that is now going on, I would certainly assume would continue. But the major decisions that would have to be made could be addressed to the Board, and the Board would have the opportunity to discuss mutual problems and, by nature of the representation, be in the best possible position to implement the decisions.

Mr. RIEHLMAN. Yesterday, in discussion with General Trudeau, I tried to pursue this same type of questioning to find out if, when there is a misunderstanding which cannot be resolved at a lower level between people who are trying to coordinate these activities, that finally it would come up to the top, to Dr. Glennan and to the Secretary of Defense.

Secretary CHARYK. That is correct.

Mr. RIEHLMAN. And if they couldn't agree, then it would go to the President. But General Trudeau thought it might be better settled

by having the Secretary of Defense have the final say as to how this should be settled. What would be your opinion in that respect?

Secretary CHARYK. Well, I would come back to some of the statements that General Schriever made, to the effect that I think that the character of the civilian program and the military program will become more and more different with time, and that it would not be appropriate to have the Secretary of Defense in a position to make a decision which would abrogate the responsibilities of the Administrator.

Mr. RIEHLMAN. That brings us to the second part of my question. It follows from what my colleague, Mr. Chenoweth, went into, and General Schriever started to answer, but he didn't go into detail. This is exactly what you were saying a minute ago, that as time goes on, there is going to be a greater divergence in this field. I would like some statement from General Schriever as to exactly what he means in that respect.

General SCHRIEVER. I have listed a number of items—just jotted them down—of military in space as we look to the future. I have already pointed out that in the military we are going to have a relatively large number of satellites for warning purposes, for surveillance purposes, for communications purposes, perhaps later on for satellite defense systems. So our requirement is for relatively large numbers.

I don't see that this will ever be a requirement for civilian exploration of space, because here you are going to be building new experimental payloads, you want to get new data, and once you have succeeded in one shot and get this scientific data, you will want to get others, so that you will have fewer shots. You will have changing payloads.

In the military you will attempt to get a payload that is reliable, that can function perhaps for as long as a year in space. We will need to have systems that are simpler to maintain and operate because we have military personnel that will be rotating and we would have to have simplicity in maintenance and operations. NASA will be largely experimental, and research in nature. The X–15 is an example of an aircraft in that category.

I think their space vehicles will be in that sort of a category as well. We need to get low cost per launch. Their emphasis will be to get the highest degree of reliability on a launch. And the cost will be subordinated to that, they want to get performance and reliability for a specific launch. We will be time-oriented, there is an urgency from a defense standpoint. They are time-oriented in a general sense, but we are time oriented to get there as fast as we possibly can, and also time-oriented when we get the systems they have to be responsive. We have to be able to get them off in a hurry when we need them.

I think this degree of urgency requires a bolder approach, a greater caculated risk on the part of the military than on the part of the civilian agency.

And lastly, in the military we have the developer-user relationship. We are talking about a medium, we are not talking about just hardware. We are talking about the ground environment, the people that have to be trained to operate and maintain them, the supply lines,

the integration of those systems with other systems in the military. All of these things tend to diverge, I think—the military program from the civilian program. And lastly—I am not interested in going to Venus at this time. Maybe later on I will be. NASA is, today. So they are interested in deep space operation. We are not interested in deep space operation, except from what we gain in terms of scientific and technical knowledge.

The CHAIRMAN. The gentleman's time has expired.

General SCHRIEVER. At some later date we probably will have application.

The CHAIRMAN. The gentleman's time has expired.

Mr. Wolf.

Mr. WOLF. Mr. Chairman, gentlemen. The last time that I happened to be here and General Schriever happened to be there, I was accused of supplying information to Tass. I hope that the Tass reporter will begin to write now.

Mr. Chairman, it appears to me that we have here a fascinating paradox. On the one hand, the President and the Congress have said that we want to pursue space exploration for peaceful purposes with all due speed. On the other hand, we are saying: But we don't want to inhibit our military in any way from getting there. We want them to have the same opportunity in space. What we have tried to do is to capture a propaganda advantage by saying we want to proceed into space peacefully, but yet we are saying, in effect, that we want to modify the law so that it will appear that we can get there with military equipment at the same speed.

Now, don't misunderstand me, I never could see how we could separate the two. I never could buy the idea that you can have peaceful and military exploration of the same area, and not work together very closely. I noted in your comment here that in the interest of national survival the military must not be inhibited in its activities in exploiting the medium of space and in conducting the research and development in this medium necessary to discharging its basic responsibilities of defense and survival. I agree with this, I agree with this wholeheartedly. But I think this results in the very paradox that I am suggesting.

It seems that what we are doing is having a play on words the last few days in our committee on what we mean. What we really mean is we want the world to think that we want to explore space for peaceful purposes, but what we really want is to have our military strategy working right along with them.

I may be wrong, General. I would like to have you comment, if you think I am. When I refer to you, General, it is out of respect, sir, it is not out of any disrespect.

General SCHRIEVER. I don't think there is any question but that there is tremendous military potential in space, and I can just quote the systems that we have under development today which will make a tremendous contribution to our defense posture by reducing the element of surprise which is one of our biggest problems that we have today. Our warning system, the Midas system, our surveillance system, the SAMOS, there is a great gap in intelligence information between what they know about us and what we know about them. This might close that gap to some extent.

Communications satellite. We need to have very quick communications. Our decision-making machinery has to be speeded up so that we can make decisions in 15 minutes or in a matter of minutes, whereas it takes considerably longer now, and communications satellites could bring about a tremendous improvement in our communications systems from warning to our commands and then into the policy and decision-making levels of the Government here in Washington.

Mr. WOLF. The point I am getting at is this. I discussed it the other day. Why did we go to all the trouble to transfer this program over to NASA, to change our approach to indicate peaceful purposes, when now we seem to say that we don't really mean it after all? Why wouldn't it have been better to have had a strong statement from the military, from the President, and from the Congress to the effect that we want to proceed into space in a peaceful way, but let's not kid ourselves; this is a cruel world we live in, and let's be militarily ready. Let's hope that we can proceed into space using the tools of the military, just as we opened the Panama Canal for peaceful purposes, and yet it has been a tremendous tool to us in time of war. It was the Army, I understand, which did it. At that time we didn't have an Air Force. They might have been in on it otherwise. [Laughter.]

Isn't this correct thinking?

General SCHRIEVER. Yes, sir; although I wouldn't know—I think that there was never—at least as far as I know—any intent that the military shouldn't pursue space development. I think the old law was somewhat confusing. I should say the present law, not the old law. The present law is somewhat confusing as to what the Defense Department's position is. You have to read into the parenthesis that we have the authority to proceed with research and development in space?

Mr. WOLF. Let's forget all about the bill that is in front of us for consideration. Would you say that it would be a good idea if the military made a statement that they are very anxious to aid in the peaceful exploration of space?

General SCHRIEVER. I certainly have made those statements myself in speeches, and I think we would be very happy to make such a statement.

Mr. WOLF. And that we would hope that everything we do in space would have only peaceful implications?

General SCHRIEVER. Yes, sir. As a matter of fact, all the systems we have under development are passive systems; they are not offensive systems at all; they are passive in nature and they contribute to maintaining peace in the world. So in that regard they are peaceful, too.

Mr. WOLF. Thank you, General. And the Tass reporter please get this down and send it to Moscow, because we do intend to go into space for peaceful purposes. That is what I tried to establish.

The CHAIRMAN. Mr. Hechler?

Mr. HECHLER. General Schriever, I want to commend you for the emphasis you put on speeding up the decision-making machinery, not only on satellites but within the executive branch. Perhaps since the President has said we are not in a space race with Russia, a lot of people have drawn the conclusion that the space race is within the executive branch itself. For that reason I commend you for that statement.

Do you think the wording of 309(b) of the amendment insures that the President's decision on a new or basically new launch vehicle will be made at the very beginning of the basically new launch vehicle, or do you think such a decision by the President could be made after NASA and the Department of Defense started similar projects, or after a launch vehicle was completed?

General SCHRIEVER. Let me say this, from where I have sat, at the ballistic missile level, and now at the Air Research and Development Command level, that our present machinery of checks and balances, which is largely "checks," it would be impossible to start a new booster development program without getting prior approval as to whether it would be NASA or Defense Department.

I can assure you by my experience this would be an impossible thing to accomplish.

Mr. HECHLER. Well, in a program which demands the utmost urgency in order to move forward in competition with Russia, isn't it necessary to try to remove some of these checks in a way that would produce a far quicker decision? Wouldn't it be possible, for example, to set up in the East Wing of the White House, where Fred Vinson once directed the economic stabilization program, a Director of Aeronautics and Space, with a very small technical staff that could make a direct decision which would not only resolve conflicts, but would avoid conflicts that may possibly arise between these two agencies?

General SCHRIEVER. Well, I frankly don't believe that you are going to have very many conflicts. And you set up an agency like that and no matter how——

Mr. HECHLER. I am not talking about an agency, General.

General SCHRIEVER. I am talking about the office, even. You set this office up and even though the intentions are the best, these matters become very complex from a technical standpoint, and the first thing you know, why, they justify additional people, and then they move out of the East Wing of the White House into the old State Department Building, and——

Mr. HECHLER. General, my time is very limited. But the experience of the past in the fields of economic stabilization, food, rubber, other areas where this has been done, proves that it has been possible to do this with a small staff that has not burgeoned into a tremendous agency.

I think we are seeking here the power of decision, the power of quick decision, which I think is important for the future security of the country. Although I am a bachelor, I am interested in the security of these offspring, too. [Laughter.]

General SCHRIEVER. I am, too. I would not categorically say that it will not work, but I would—I would much prefer to proceed with the proposed bill as it is without such an agency in the White House at the present time, I think.

Mr. HECHLER. I must say to both of you gentlemen, with all due respect to you, I am not impressed with the Activities Coordinating Board which seems to have been devised as kind of a sop to this committee. If it was so important, why was this not thought of long before this committee brought the matter up of the necessity to replace the CMLC and the Space Council? Mr. Secretary, would you comment on that?

Secretary CHARYK. Yes; I might comment on that.

Actually, the idea behind this type of a board is not of recent origin. We have had discussions over many months, particularly in regard to the launch vehicle area, and it had been suggested, for example, to set up a launch vehicle board, if you will, or committee, with the same type of membership as indicated for this Activities Coordinating Board: namely, people who have the actual program responsibility.

Mr. HECHLER. And they, too, have a stake, though, in the activity of the agency that they represent. They are, to use a word that I have heard the President use, they are a little "parochial" perhaps in their outlook. Therefore what you need is an independent man above who can crack the heads together, who can set the goal, who can make sure that we move forward with the utmost urgency.

Mr. QUIGLEY. Would the gentleman yield?

Mr. HECHLER. Gladly.

Mr. QUIGLEY. I am very skeptical about the Activities Coordinating Control Board. I would hope if it becomes a reality the first thing it would do would be to change its name. [Laughter.]

Thank you.

Mr. HECHLER. I yield back the balance of my time.

The CHAIRMAN. You have one final question? Does the gentleman yield back his time? I had an arrangement with him to let him know 30 seconds ahead of time.

Secretary CHARYK. I would like to make one comment which might be helpful.

In the ballistic missile program it was found desirable to set up a mechanism that would permit effective decisionmaking on a simple streamlined basis at the highest levels. We activated in the Air Force a Ballistic Missile Committee and I think that the results in the ballistic missile program attest to the effectiveness of this mode of operation. The membership of the Ballistic Missile Committee included all of the individuals in the Air Force who had final decision responsibilities. They came together as a body and acted on recommendations made to it by the Ballistic Missile Division which was under the direction of General Schriever. Decisions were able to be made promptly, effectively, and were implemented.

The scope of this Committee has now been broadened to include the military space systems and we think that the same concept is implied here in this Activities Coordinating Board. And I think that the effectiveness with which the Ballistic Missile Committees in the Department of the Air Force and Department of Defense have operated is a good omen for the effectiveness of this type of operation.

The CHAIRMAN. The gentleman's time has expired.

Mr. QUIGLEY. May I have a minute to comment on that?

Mr. FULTON. I ask unanimous consent.

The CHAIRMAN. Shouldn't we recognize Mr. King, and then you might make the comment?

Mr. FULTON. I ask unanimous consent to give the gentleman a minute.

The CHAIRMAN. I am sure there is no objection to giving the gentleman a minute.

Mr. King, if you will suspend here for a moment.

Mr. KING. Glad to, Mr. Chairman.

Mr. QUIGLEY. Thank you.

May I say this: You struck a very sore point with me. The minute you start talking about coordination of a missile program, the old Thor-Jupiter bugaboo looms up to haunt me. Now, on the basis of that sad and bitter experience, which I hope we will never duplicate in the space age, but I fear we might, the Air Force learned something, and I say this with no reflection on any of the committees that you set up, or on how well they functioned. I am inclined to think that the Air Force has gotten as far as it has in the missile program, not because of the work of any committees, but because it had a tough taskmaster at the top in the person of the general who is testifying here today, who knew what he wanted to do, and he saw to it that it got done, no matter how many committees he had to bypass, coordinate, cooperate with, or otherwise. He was a man who was out to get a job done. I am convinced that is the only way we are going to get anywhere in space on a peaceful, military, or any other basis. We are going to have a General Schriever, General Medaris, or Admiral Hayward or somebody who is going to take hold of this thing, all facets of it, and do the job.

The CHAIRMAN. May I say this: The Air Force is the last agency that should take exception to some outside agency stepping in. I can remember the events which occurred when Billy Mitchell was trying to encourage the development of airpower. The Air Force was dying on the vine, and it took an insurgent type of individual like Mitchell to bring about a change in attitude.

Now, it is in the best interests of our country that space science be developed. If the program is impeded, maybe some outside agency could provide a stimulus. For instance, it may seem to be a small matter, but let me call to the general's attention the fact that he is commander of the Air Research and Development Command, but there is no mention of space in that title. It seems to me the first thing the general should do would be to have himself made commander of the Air Space Research and Development Command. [Laughter.]

Mr. QUIGLEY. Aerospace.

The CHAIRMAN. Aerospace Research and Development Command. Now would you want to comment? The Air Force, the name of the service itself, does not cover space. Should it not cover space?

Mr. FULTON. I move this not be taken out of Mr. Quigley's time.

General SCHRIEVER. Mr. Chairman, I would go along with that suggestion. Could I make just one comment. I appreciate your faith in me.

Mr. QUIGLEY. Before you say it, General, I wish I had a nickel for every committee you have bypassed to get the job done. [Laughter.]

General SCHRIEVER. Well, that is true. [Laughter.]

I will say this, that the Ballistic Missile Committee structure that Secretary Charyk described was actually established as a result of an investigation or a review of administrative procedures which we carried out, ourselves, and the Ballistic Missile Committees were established to streamline the procedures, and they have helped very greatly in the decisionmaking machinery in the Pentagon.

The CHAIRMAN. Mr. King is recognized for 5 minutes.

Mr. HECHLER. Would the gentleman yield for a brief observation?

Mr. KING. I would be glad to yield to my distinguished colleague from West Virginia.

Mr. HECHLER. All I want to say is with the utmost seriousness with respect to the future security of this Nation, may God give us the power of decision.

General SCHRIEVER. I could not agree with you more.

The CHAIRMAN. Mr. King?

Mr. KING. I suppose one of the prices one pays for coming in at the tail end of this illustrious congregation of wit and brilliance is that most of the grass has been trampled down by the time it gets to me, and you probably have spoken your piece many times over; but let me reapproach one of these two old themes that you have talked about already.

First of all the matter of the peaceful uses of space has been suggested. May I explore that for a minute, even though it may not have direct bearing on the bill before us?

It has been suggested to me on occasion that the use of these reconnoitering satellites—and I have been told there is a difference between reconnoitering and reconnaissance, although I am not sure that I know what the difference is—but I have been told that the use of these reconnoitering satellites would have a great bearing on our general disarmament program on the theory that it would disclose many of the secrets that the Russians now have. Of course, secrecy is the big barrier that we have to disarmament, because as long as they have secrets they will not go along with our inspection system, and so on. So the proposition has been made that if we vigorously pushed these reconnoitering satellites, it might do as much as any other single thing to get the Russians to agree on a disarmament program.

Do you see some possibilities? I am addressing this either to the General or to the Secretary, whoever would like to answer it.

General SCHRIEVER. I see a lot of possibility, yes, sir.

Secretary CHARYK. Well, I think that the fact that one of our major programs in the Defense Department is aimed in this direction is an answer unto itself as to the importance we attach to this type of capability.

Mr. KING. All right. Is that your——

General SCHRIEVER. Yes, I think it does have this potential, yes, sir.

Mr. KING. It would tend to equalize what is now quite a differential between us and the Russians since they know practically everything about us, and there is a lot that we do not know about them.

General SCHRIEVER. That is exactly right.

Mr. KING. This satellite would equalize United States-Russian intelligence, so we could bargain on an equal footing, which we are not now doing, at least in some areas, is that not right?

General SCHRIEVER. I think this is correct, and I think this is the reason why these are so important to us and perhaps relatively unimportant to them.

Mr. KING. So that pushing a program like that would not tag us as a warmonger, we could do this legitimately and in good faith in the interest of peace, is that right?

General SCHRIEVER. I think so. Certainly there is nothing there that could attack. It is a passive system.

Mr. KING. Now, getting back to the matter that has occupied our attention all morning. As I understand it, there are two basic approaches to this problem: One conceives of our space effort essentially as two programs, the military and the peaceful. There are two programs, which, if coordinated, can still move forward as two programs. The other philosophy emphasizes the unity of the program, contending that, essentially, it is one program rather than two. It seems to me we have two rather distinct poles of thought.

Now, am I correct in assuming that because you endorse the bill now before us, you believe that we can operate our activities in space as two programs, provided, of course, that there is coordination, but still two programs, and that our national program will not suffer because we divide it into two rather than conceive it as one unit? Is that a correct statement?

Secretary CHARYK. I would quarrel with that to this extent, that I think that we have a defense program and a civilian space exploration program. I would not say that we have two space programs, per se.

The Department of Defense has an important responsibility in regard to the defense of the United States. I believe that this responsibility implies that the Department of Defense should use whatever means are available to more effectively discharge its responsibilities.

In certain instances the use of the space medium will provide novel ways of doing a job, better ways of doing a job, and if this is the case I think there should be no restrictions on the Department of Defense to move out and get the job done.

At the same time we have to measure a particular space system and its effectiveness as contrasted with other ways of doing the same job.

For example, communications might be a good example. We have to evaluate whether a satellite communications system to accomplish a particular military function is a better way to proceed than, let us say, by land lines or by radio means. So that we have, it seems to me, a clear-cut responsibility and we exploit space in the same way we exploit the air medium, the water medium, or whatever is available to do our job better.

Contrasted with that is the NASA responsibility to carry out a program for the scientific exploration of space. I think that there is a definite difference here and that it would be better to describe it as a defense program on the one hand versus a scientific space exploration program on the other hand.

Mr. KING. What you seem to be saying in effect, then, is that it is really up to NASA to spearhead the so-called space program, at least the scientific aspects of it, extending our horizons of knowledge in space; and that the DOD will make use of the information that is developed insofar as that information can be used to help our defense effort?

Secretary CHARYK. I think that would be a fair statement.

The CHAIRMAN. Will the gentleman yield?

Mr. KING. Yes.

The CHAIRMAN. You referred to communications. Of course, communications is a civilian program, it is a peacetime program; but the military needs communications, so the military utilizes what the civilians have developed in communications.

For instance, in the development of your DEW line, you went to private agencies, and they developed communications to meet the requirements of the military, is that not true?

Secretary CHARYK. Yes.

The CHAIRMAN. It seems to me that with respect to the space program, a program with great possibilities, it is bound to have greater possibilities for peaceful utilization in the long run. Of course, there will be military applications of these developments; and the military program is a counterpart of the civilian space program. Is that not substantially correct?

Secretary CHARYK. Well, I think that that is right, Mr. Chairman, with the possible reservation that we do not feel that we have a mandate to explore space for space's sake. Rather, we have a mandate to exploit whatever medium can permit a military responsibility to be discharged more effectively.

The CHAIRMAN. Do you not think that NASA has a mandate to explore space for the peaceful use of space?

Certainly NASA ought not to figure that it has a mandate to spend great sums of money unless their programs develop important, peaceful uses, is that correct?

Secretary CHARYK. I think that the NASA mandate is really the scientific exploration of space.

The CHAIRMAN. I can remember the days of the big battleship, when nobody believed in airpower, and I think that if you had not had outside influences you might not have developed airpower. I wonder if, without outside influences, we are going to get the proper development in space sciences.

Secretary CHARYK. Well, I have little doubt that the civilian scientific space exploration program will be a very valuable asset in determining our military space activities.

The CHAIRMAN. I think it is vital. You say you do not have an immediate use for the big booster. You cannot sell me on the idea that when you get a booster that will raise a payload of, say, 25 tons into outer space that the military will not have a use for it. They will, and they will move in at once, and use it, and it will have very important military implications. Is that not true?

Secretary CHARYK. We certainly support the large booster program because we are also confident that there will develop important military applications for a large booster.

The CHAIRMAN. Mr. King has been recognized.

Mr. KING. I am through.

The CHAIRMAN. I have intruded on your time, Mr. King.

Mr. FULTON. Mr. Daddario.

The CHAIRMAN. Mr. Daddario would like to ask a question.

Mr. DADDARIO. You have said, General Schriever, that we are preoccupied too much with duplication? You said that today, and on other occasions.

General SCHRIEVER. That is right.

Mr. DADDARIO. Now, what is the present capacity of the Air Force in the field of aerospace medical research?

General SCHRIEVER. We have a considerable capacity there. We have in the order of 1,200 scientists in this field. We have laboratories at Wright Field. We have a great deal of activity going on

at Holloman, also at Brooks Air Force Base in Texas. We have long been involved in the aeromedicine area. I think that—I would say it is a fair statement that the Air Force has pioneered in the aeromedicine or life sciences area.

Mr. DADDARIO. Now, although you say there are different objectives for military and civilian space programs, both of them, I imagine, will utilize men sometime or other?

General SCHRIEVER. Yes, sir, I am sure of that.

Mr. DADDARIO. Therefore, whether or not a man goes into space for the military or for the civilian program does not make too much difference, does it?

Mr. FULTON. Will you say that again, please?

Mr. DADDARIO. Well if the General does not understand it, I will repeat it.

Mr. FULTON. I did not hear it. Would you please read it, Mr. Stenographer?

(Question by Mr. Daddario was read.)

General SCHRIEVER. Well, I think it does. I think the military must have its capability to carry on the man-machine relationships. That is, in the final analysis the machine and the man are part of a weapons system and there is no hard and sharp line, really, between space and the man operating at 60,000 or 80,000 feet. Many of the environmental conditions are the same. Sure, you do not have zero gravity and there are other things that are introduced when you are out in space.

Mr. DADDARIO. But if I can stop you there, it is within the capacity of the Air Force to extend its capabilities even to that end, is it not?

General SCHRIEVER. Yes, sir, it is.

Mr. DADDARIO. You have the groundwork laid already to do so?

General SCHRIEVER. Absolutely.

Mr. DADDARIO. All right. Now, you say there are no differences between the Air Force and NASA. I would like to ask under the present act, and the amendments which are now being proposed, who will settle the question whether the Air Force or NASA should handle aerospace medical research. NASA is setting up an agency or a capacity or a competence of its own in this particular area. Should they, or should they not have it? Who should decide? Why can it not be kept within the Department of Defense? Why cannot NASA set its requirements, and give them to Defense to be developed?

General SCHRIEVER. Well, let me say this, that I did not mean to infer that there would never be any differences. There certainly will be some. I do not think there will be many. We have worked with the old NACA for years in this area. We have supported them in the aerospace or life sciences area. We are supporting them in this area completely in the Project Mercury, for example.

I personally feel that the setting up of a life sciences organization of a large scale in terms of facilities and resources in NASA should be looked at very carefully. It has not been brought to my level for coordination. I think——

The CHAIRMAN. Mr. Fulton, you had a question?

Mr. FULTON. Was the gentleman through?

Mr. DADDARIO. I just have one question.

The CHAIRMAN. The House is now in session.

Mr. DADDARIO. General, I support the idea of the Air Force having these facilities. I think that the Air Force has a good start, and since it has done so well, that its capacity ought to be enlarged to take care of our future requirements. I can see no need whatsoever of NASA getting into this area. I share Mr. Quigley's belief that there should be duplication in certain areas, but where there is a capacity already developed, it ought to be left to develop further, as necessary. When you start transferring departments from one agency to another, when you start transferring skills, this is where you lose ground, where you start slipping back.

General SCHRIEVER. I think—I would agree with you although I have not gotten into this one in detail. Certainly the military—in the military the man is extremely important. We are never going to win wars with pushbuttons alone, I can assure you.

Both the Air Force and the Navy, also, have been operating in this area. I think we have in the military a very good capability in the field of life sciences and that it will have to be expanded.

Mr. DADDARIO. It can be and will be.

General SCHRIEVER. Yes, sir.

The CHAIRMAN. No further questions.

Mr. FULTON. I have one.

The CHAIRMAN. All right, Mr. Fulton.

Mr. FULTON. I agree with General Schriever on his approach to the problem of space exploration. We must have enough sense in America to keep our basic research programs going; our research and development programs both in the military and in NASA. We have, within the budget, room for research that is broad even to the point of duplication, so that we can get a good broad base for research in various avenues. Do you not agree with that?

General SCHRIEVER. Yes, sir. And I think our system is such that you will not have a significant amount of undesirable duplication. I really believe that our system will prevent that.

Mr. FULTON. I agree. The second thing is this: I do not think the services or the Department of Defense should be restricted in their research and development of weapon systems to the point that they must justify a weapon system in the budget or they do not continue on basic research. I think it must be broader than that. Do you not both feel that?

General SCHRIEVER. Yes, I do.

Secretary CHARYK. I would agree wholeheartedly, Mr. Fulton. And speaking of areas in which needless resources can very easily be expended, I think some of the most significant cases that we can point to are those where we attempted to go ahead with a complete weapon system development without having the basic information in hand and you could have duplicated basic research activities several times over and not even approached the kinds of dollars that were expended only to find that we had omitted some rather fundamental piece of information back along the road. So I think that the amplification of the research base and the development of knowledge at that level before we go out with a complete major weapon system development is extremely important.

Mr. FULTON. The other point is this: Space is space, whether it is space at the center of the world, on the Earth's surface, on the sea, in the air, in the atmosphere, or in the borderline, where the Air Force

is now operating between the atmosphere and space. I think the same principles should apply in any part of space as to the division between civil and military, and the United States should promote that philosophy as we explore space.

For example, space at the center of the Earth is probably N with a zero on it. Then as you go into the three coordinates, A, B, and C in space, it is simply in three dimensions, N–1 with the coordinates A, B, C, N–2 with the coordinates A, B, C, picking your points in space, but the philosophy does not change from one point to another. So, we are going into space for peaceful purposes—I am sure we are running this country for peaceful purposes. It may be hard to tell which is military and which is civilian. But if you take an extreme case, you can see where the philosophy holds.

For example, trucks are very important to the military, but I am sure the military would not propose to take over the whole trucking industry of this country.

Mr. WOLF. You cannot tell, Jim.

Mr. FULTON. Planes are important. But the military never took over the National Advisory Committee for Aeronautics.

That means that in each sphere, and at each level, of space we have these principles of division. And in the final analysis, I must cast my vote for civilian control. Now, would you not agree with that as a basic premise on the approach to space?

Secretary CHARYK. I would say that that is an excellent statement and I think it would be a very great mistake to try to draw artificial lines between air and space.

Mr. FULTON. I agree with you thoroughly. How about you?

General SCHRIEVER. I agree with that a hundred percent.

The CHAIRMAN. Any further questions?

Mr. SISK. I have several questions, but I realize the House is in session.

The CHAIRMAN. This is a very important bill. We will have an opportunity to ask all our questions in future hearings. We have 2 weeks more of hearings. I hope the members can attend them because they are important. I would like to have all the members hear every bit of testimony.

Mr. Secretary and General, you have made excellent witnesses and we appreciate very much your appearing here.

Secretary CHARYK. Thank you, Mr. Chairman.

The CHAIRMAN. The committee will adjourn until Monday morning at 10 o'clock.

(Whereupon, at 12:11 p.m., the committee adjourned, to reconvene at 10 a.m., Monday, March 21, 1960.)

TO AMEND THE NATIONAL AERONAUTICS AND SPACE ACT OF 1958

MONDAY, MARCH 21, 1960

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND ASTRONAUTICS,
Washington, D.C.

The committee met at 10 a.m., Hon. Overton Brooks (chairman) presiding.

The CHAIRMAN. The committee will come to order.

This morning, we have two very important witnesses. Mr. Franklyn W. Phillips, Assistant to the Administrator of the National Aeronautics and Space Administration, will open the hearings. Following him, we will hear Mr. John Floberg, a Commissioner of AEC.

Now, this afternoon we'll have a pretty vigorous session on the floor of the House, so we'll have to be finished before noon.

I suggest, therefore, that we proceed with Mr. Phillips and try to finish with him by a quarter to 11. That will give the Commissioner of AEC, Mr. Floberg, the balance of the time. We may have to go around the room to the various members for their questions faster than usual; then again it may be that the attendance will be a little light this morning and there won't be any problem. However, we are certainly happy to have you here, Mr. Phillips.

You have a short statement. If you will proceed with your statement, we will appreciate it, and then we will ask you some questions.

Mr. PHILLIPS. Thank you, Mr. Chairman.

STATEMENT BY FRANKLYN W. PHILLIPS, ASSISTANT TO THE ADMINISTRATOR, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Mr. Chairman and members of the committee, it is a pleasure for me to have this opportunity to discuss with you today the operation of the National Aeronautics and Space Council. The functioning of this Council has been the basis for much conjecture and I want you to know that I fully appreciate your desire for information which can be used as a basis for appropriate changes in the Aeronautics and Space Act of 1958.

As you have been advised, I have very recently been relieved as Acting Secretary of the Council and this position is now held by Mr. David Z. Beckler in the Office of the Special Assistant to the President for Science and Technology. However, I served as Acting Secretary of the Council from January 1959 to February 1960 and prior to that time was intimately familiar with its operation. My statement, therefore, is made from this vantage point.

As Acting Secretary of the Council, I was responsible to its members, to perform whatever functions they required in prosecution of the Council's business. There were, of course, certain specific responsibilities assigned to me.

I was responsible for arranging meetings, formulating agendas in consultation with the members of the Council, preparing and distributing appropriate material, and recording actions taken at Council meetings.

The staff of the Council, those engaged exclusively in work for the Council, was comprised of myself and my secretary. There were, in the offices of each of the Council's members, staff people responsive to my needs, and I had free access to call on them for whatever assistance I required.

Including the first, and organizational, meeting of the Council on September 24, 1958, it has met a total of eight times. All of these meetings were chaired by the President as required by the act. In addition to these regular meetings, there have been eight so-called informal meetings attended by Council members or their representatives. The purpose of these "informal" meetings has been to sharpen the issues that were, at a later date, to be presented to the President.

It is important to note here that the Council's function is to advise the President in the performance of his duties as prescribed in section 201(e) of the act. Although these duties call upon the President to perform certain planning and management functions, the Council remains in an advisory capacity and has no management functions in its own right.

The membership of the Council is an illustrious one drawn from Government and private life and it provided broadly based policy advice on such matters as transfers of projects and facilities to the National Aeronautics and Space Administration, international cooperation including U.S. participation in United Nations space activities, a national space vehicle program, assignment of national priorities, long-range plans for the Nation's space program, relationship of United States and Soviet space programs, and the organization and operation of the Nation's tracking and other ground support facilities.

The Council has performed a useful function during the early transitional period during which the Nation's space program was being organized. Now that the program has reached a state of maturity, the need for detailed management by the President and the need for his advisory Council is less obvious.

Now, Mr. Chairman, I will be glad to try to answer whatever questions the committee has.

The CHAIRMAN. Well, Mr. Phillips, you are a member of the Space Council. This is the first time that any member of the Space Council has been before this committee.

Mr. PHILLIPS. I was not in fact a member of the Council, but rather its secretary.

The CHAIRMAN. Secretary?

Mr. PHILLIPS. That is correct.

The CHAIRMAN. You were cognizant of all of the work undertaken by the Council in its advisory position, and otherwise. I wish you would tell the committee, in general language, how important you think the work of the Council has been, and whether or not you think

it should be continued? What do you mean by the term "less obvious" on page 3 of your statement?

Mr. PHILLIPS. Well, starting at the beginning of your several questions, I think the Congress was very wise in establishing the Council under the original act, for it provided a forum for our space activities to be brought to the attention of the President at a time when our overall national program was being organized.

I think in this respect the Council has performed a very useful function. The reason that I said it was less obvious that there was this need now is that I would be the first to admit that it is a matter of judgment as to how far down the road we have gone in our organization of the program.

It is my personal opinion we have gone far enough, that there is no longer need for the Council. This is based on a number of things. The fact that the President continues to have numerous opportunities to not only be advised, but to, certainly, participate actively in any matters that require his participation in the program at the present time.

The CHAIRMAN. Well, would you recommend that the heavy responsibility that the President has be continued? I question the wisdom of putting so much work on the President. If the Council were to be operated without mandatory requirement that the President chair the Council at every meeting, would the Council be useful?

Mr. PHILLIPS. You are saying if the Council were to remain with its present membership with the exception of the President as chairman, would there be a use for the Council?

The CHAIRMAN. No, I don't mean with the exception of the President as chairman, but rather, that we remove the mandatory requirement that the President be present at each meeting. He might designate an acting chairman to preside in his absence, or some arrangement of that sort. Would the Council be useful under such circumstances?

Mr. PHILLIPS. Well, I certainly believe that any time you bring together a group of people as competent as the members of the Council are, you are certain to serve a useful purpose. I think that the question that must be answered is whether the purpose the Council would serve is sufficiently useful and is sufficiently necessary at this time to require them to sit regularly in conference to review the program that our Nation has set up in space. In other words, I think it is strictly a matter of judgment as to how useful a function they would perform. It can certainly be done in another way, and that is relying, as one must rely, on the administrators of our programs, the Secretary of Defense in the case of the defense program, the Administrator of NASA in the case of the NASA program, to conduct their programs in a way that will bring for the United States the result we are all after, and at the same time relying on them to work together to the degree that it is necessary in order to get the job done.

The CHAIRMAN. This morning I think we will reverse the order of questioning by the members. Therefore, we will ask Mr. Roush, who is at the other end of the committee, to proceed with questions.

Mr. ROUSH. I have no questions, Mr. Chairman.

The CHAIRMAN. Mr. Riehlman?

Mr. RIEHLMAN. I have no questions.

The CHAIRMAN. Mr. King?

Mr. KING. Mr. Phillips, let me make certain that I understand this. Under the law, the function of this Council is essentially that of informing the President; is that what you said? I think you also mentioned that he had other responsibilities. I didn't quite understand what those others were.

Mr. PHILLIPS. The responsibilities of the President are clearly spelled out in section 201(e) of the present act. The Council's responsibilities are to advise the President with respect to the performance of these duties. So the Council's function is an advisory one.

Mr. KING. I don't quite understand why we have to have regular meetings which the President chairs, if the function of the Council is simply to give him a briefing. A meeting conducted by a chairman isn't well adapted to giving a man a briefing, is it?

Mr. PHILLIPS. I think we are interpreting the word "advise" differently. Certainly, one of the functions that was performed by the Council was to provide a forum in which the President could receive information, but this information was essentially to enable him to make the decisions that he, as the Chief Executive, has been required to make over the past 15–16 months that the Council has been in business.

Mr. KING. In other words, the President, as Chief Executive, as well as by specific statutory provisions sprinkled throughout the law, is required to make specific decisions? He is the final arbiter on many matters, as we have heard in this committee time and again.

(Mr. Phillips nods.)

Mr. KING. So, in effect, this Council was designed to bring the President up to date sufficiently so that he could act intelligently in these many areas of specific decisionmaking; is that right?

Mr. PHILLIPS. That is a reasonable statement of it, yes.

Mr. KING. Now, you are suggesting that the purpose of the Council has been fulfilled because the President now has access to this information through sources other than the Council; is that correct?

Mr. PHILLIPS. The Council has at no time been the sole source of the advice received by the President.

Mr. KING. He has a scientific adviser.

Mr. PHILLIPS. He has an adviser, of course, in science and technology. He receives advice individually from the members of the executive department throughout the Government.

Mr. KING. You feel, then, that he now has sufficient sources of information, and that this Council no longer serves a useful function?

Mr. PHILLIPS. I think the Council is no longer needed, that is correct.

Mr. KING. Although you do feel it perhaps did serve a useful purpose for the first 18 months, when things were still new; is that correct?

Mr. PHILLIPS. That is correct, yes, sir.

The CHAIRMAN. The gentleman's time has expired.

Mr. Fulton.

Mr. FULTON. You have a good statement here. The question comes as to how shall this committee get long-range planning, separate and apart from the day-to-day administration of our space programs? I was a member of the select committee, and originally I thought this was a pretty good setup, as did some of the other members of the committee. I am sorry to see that it hasn't worked.

There was no idea of giving this group management functions. We were trying to build upon the old organization, NACA, and to provide a high-level organization where there could be discussions of long-range U.S. space policy. One reason I hate to see the Council disbanded is that it is composed of high-level people who have been willing to give their time; and it would appear that if they are to be disbanded, someone believes that there is no need for such long-range planning. I think there certainly is such a need. Either that, or someone believes that they have not measured up; have not functioned adequately.

Don't you agree with that?

Mr. PHILLIPS. May I ask you a question, first? At the beginning of your question you stated——

Mr. FULTON. I don't believe I have been sworn. [Laughter.]

Mr. PHILLIPS (continuing). That you feel that there is a need for this committee to receive information from something separate from the Administration. Were you referring to the NASA at this point?

Mr. FULTON. Let me give you an example. I am on the Foreign Affairs Committee in the State Department. There is a long-range planning group, as you may know. This group plans for a longer term than just the daily operation of the State Department or the administration of a specific program.

Now, it would seem to me that there should be such a group of high-level people without either power of decision or management powers who would engage in long-range planning of our space program. Such a group would have quite an influence because of the cogency of their arguments, and because of the standing they would have in the scientific and civic community. Now, if we disband them, we seem to say there is no need for their services, and that brings me to the point I want to make: One of the key considerations in the formulation of our policies in international affairs is going to be space.

Now, if it is necessary to have long-range planning on Euclidian geometry for the State Department, why is it not necessary on Einsteinian curved universe, on the same theory?

Where do you stop? What number of feet above the Earth's surface do you stop?

Mr. PHILLIPS. With respect to long-range planning there is no question but what there is a need for long-range planning in our space effort. It is my understanding that this committee has received from NASA a briefing on a long-range plan for the exploration of space and for space research.

Mr. FULTON. Yes, but why shouldn't we have a group at a very high level which has the President's ear; a group which will not have direction or management or administrative functions but whose opinion will have great weight in these scientific and civic areas? As my time has expired, may I ask you to put in the record at this point the names of the members of the Space Council who have served up to this date, as well as their backgrounds? And I would also like to have, in outline form, not in detail, the type of recommendations that the Council came up with on programs or long-range policies.

That is all, sir.

53283—60——17

(The information requested is as follows:)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION,
OFFICE OF THE ADMINISTRATOR,
Washington, D.C., March 31, 1960.

Hon. OVERTON BROOKS,
House of Representatives,
Washington, D.C.

DEAR MR. CHAIRMAN: In response to a request made by Congressman James G. Fulton in the course of my testimony before the Committee on Science and Astronautics on March 21, I am enclosing a list of members, past and present, of the National Aeronautics and Space Council and an outline of representative program and policy matters that have been discussed by the Council.

With reference to the outline of matters discussed by the Council, I want to point out that essentially all such subjects contained elements of long-range planning.

Sincerely,

FRANKLYN W. PHILLIPS,
Assistant to the Administrator.

MEMBERSHIP OF THE NATIONAL AERONAUTICS AND SPACE COUNCIL

Following are the members of the Council, in addition to the President, and the periods for which they served:

John Foster Dulles, Secretary of State, September 1958 to May 1959.
Neil McElroy, Secretary of Defense, September 1958 to December 1959.
John A. McCone, Chairman, Atomic Energy Commission, September 1958 to present.
T. Keith Glennan, Administrator, National Aeronautics and Space Administration, September 1958 to present.
Dr. Alan T. Waterman, Director, National Science Foundation, September 1958 to present.
Christian A. Herter, Secretary of State, May 1959 to present.
Thomas S. Gates, Jr., Secretary of Defense, December 1959 to present.
Dr. James H. Doolittle,[1] Chairman of the Board, Space Technology Laboratories, September 1958 to January 1959.
Dr. Detlev W. Bronk, president, National Academy of Sciences, September 1958 to present.
William A. M. Burden,[1] Ambassador to Belgium, September 1958 to October 1959.
Dr. J. T. Rettaliata,[1] president, Illinois Institute of Technology, May 1959 to present.

WILLIAM A. M. BURDEN

Born: April 8, 1906, New York, N.Y.
Education: A.B. cum laude, Harvard, 1927; D. Sc. (honorary), Clarkson College of Technology.
Marital status: Married.
Experience—
Business:
1928–32: Charge of analysis of aviation financing, Brown Bros., Harriman & Co., New York City.
1932–39: Charge of aviation research, Scudder, Stevens & Clark, New York City.
1939–41: Vice president and director, National Aviation Corp., Aviation Investment Trust, New York City.
1941–42: Director, American Metal Co., Ltd., Union Sulphur & Oil Corp., Cerro de Pasco Corp., trustee, the Hanover Bank.
1947–49: Aviation consultant, Smith Barney & Co., Inc.
1949— : Partner, William A. M. Burden & Co.
Government:
1942: Vice President, Defense Supplies Corporation (subsidiary of RFC).

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[1] Background statements attached.

1942: Active in eliminating Axis influence in Latin American Air Transportation.
1942–43: Special Aviation Assistant, Secretary of Commerce with supervision of Civil Aeronautics Administration, Weather Bureau, Coast and Geodetic Survey.
1943–47: Assistant Secretary of Commerce for Air:
1944: U.S. delegate, International Civil Aviation Conference.
1946: Chairman, U.S. delegation, Interim Assembly, Provisional International Civil Aviation Organization.
1950–52: Special Assistant for Research and Development to Secretary of Air Force.
1956: Representative of the President with the rank of Special Ambassador, to attend the inauguration of the President of El Salvador.
1958: Member, National Aeronautics and Space Council.
1959: Appointed Ambassador to Belgium.

Memberships and clubs:
Trustee, Foreign Service Education Foundation.
Trustee, Clarkson College of Technology.
Trustee, Parsons School of Design.
Columbia University trustee.
Trustee, French Institute in the United States.
Member, Air Force Historical Foundation.
Member, Visiting Committee, Physics Department, Harvard.
Honorary curator, Aviation Literature, Baker Library, Harvard.
President and trustee, Museum of Modern Art.
Member, Royal Aeronautical Society.
Member, Institute of Aeronautical Sciences.
Member, National Aeronautical Association (director).
Member, Society of Automotive Engineers.
Trustee, Council of Foreign Relations.
Racquet and Tennis Club, New York City.
Links Club, New York City.
Metropolitan Club, Washington.
Chevy Chase Club, Washington.
Bucks and Whites, London.
Travelers, Paris.

Author:
Contributes magazine articles on aeronautical subjects.
"The Struggle for Airways in Latin America," 1943.

Legal residence: New York.
Office: 630 Fifth Avenue, New York, N.Y.
Home: 820 Fifth Avenue, New York, N.Y.

JOHN THEODORE RETTALIATA

Born: Baltimore, Md., August 18, 1911.
Education:
B.E., Johns Hopkins, 1932.
D.E., Johns Hopkins, 1936.
D.E., Michigan College of Mining and Technology.
Marital status: Married.
Experience:
1934: Instructor of mathematics, Baltimore College Center.
1934–34: Head, Department of Mathematics and instructor in engineering, Baltimore College Center.
1935: Laboratory technician, Baltimore.
1936–41: Assistant engineer in charge of calculation and development division, steam turbine department, Allis-Chalmers Manufacturing Co., Milwaukee.
1942–45: Manager, gas turbine division, Allis-Chalmers.
1945–48: Director, Department of Mechanical Engineering, Illinois Institute of Technology, Chicago.
1948–50: Dean of engineering, Illinois Institute of Technology.
1951–52: Vice president, dean of engineering, Illinois Institute of Technology, Chicago.
1952– : President, Illinois Institute of Technology.

1952– :
President, Armour Research Foundation, Institute of Gas Technology.
Director, First Federal Savings & Loan Association.
Director, Peabody Coal Co.
Director, Chicago National Bank.
Director, American Steel Foundries.
Director, Brunswick-Balke-Collender Co.
Director, Western Electric Co.

Other:
1943: Sent on special mission involving jet-propelled military aircraft for U.S. Navy Bureau of Aeronautics.
1945: Sent to Germany to investigate enemy technical developments for U.S. Navy, Bureau of Ships.
1953:
First vice president, Crearar Library and also trustee.
Director, George M. Pullman Educational Foundation.
Recipient, Pi Tau Sigma Gold Medal Award.
World War II Certificate of Commendation from U.S. Navy.
Chicago Group citation recipient.
1955:
Member, National Conference on Christians and Jews.
Member, Committee on Television, American Council on Education.
Member of committee, Arts Center Chicago.
Trustee, Chicago Educational Television Association.
Member, Government Committee on Metropolitan Water and Sanitation.
Member, Illinois Society of Medical Research.
Member of board of governors, Metropolitan Housing & Planning Council, Chicago.
Member of advisory board, college president, National Scholarship Service and Fund for Negro Students.
Registered professional engineer.
Member, American Society of Engineering Education.
Member, Educational Advisory Council, National Association of Manufacturers.
Member, Milwaukee Engineer Society.
Chairman, Western Society of Engineers.
Member, Editorial Advisory Board, World Book Encyclopedia.
Contributor of articles, engineering publications.
Lecturer on gas turbines, jet propulsion.
1957:
Chairman of the Board of Visitors, Air University.
Compiled report on gas turbines for special applications, National Academy of Sciences.

Home: 8901 South Pleasant Avenue, Chicago, Ill.
Office: 3300 Federal Street, Chicago, Ill.

NATIONAL ACADEMY OF SCIENCES,
OFFICE OF THE PRESIDENT,
Washington, D.C., March 29, 1960.

BIOGRAPHIC STATEMENT ON DETLEV W. BRONK

Bronk, Detlev W., A.B., M.S., Ph. D., Sc. D., LL.D., Eng. D., D.Med., D.Litt., M.D. (honorary), D. of Humane Letters. Included in these are 30 honorary degrees, one from Queen's University, Belfast, Ireland; one from Cambridge University, England; Royal Caroline Medico-Surgical Institute, Stockholm.
Born: New York, N.Y., August 13, 1897.
President, National Academy of Sciences since 1950.
President, the Rockefeller Institute, since 1953.
Chairman, National Science Board, National Science Foundation, since 1955.
Member, National Aeronautics and Space Council.
Member, President's Science Advisory Committee.
Chairman, Panel on Science and Foreign Affairs of the President's Science Advisory Committee.

Member, Defense Science Board, Department of Defense.
Member, Science Advisory Board to the Chief of Staff, U.S. Air Force.
Member, Science Advisory Panel, U.S. Army.
Trustee, Johns Hopkins University, University of Pennsylvania, Rockefeller Foundation, Rockefeller Brothers Fund, and many other institutions.
Foreign member, Royal Society of London, French Academy of Sciences, Royal Danish Academy of Sciences and Letters, Swedish Academy, and U.S.S.R. Academy of Sciences.
Officer, Order of the British Empire.
President, the Johns Hopkins University, 1948–53.
President, American Association for the Advancement of Science, 1952.
Foreign secretary, National Academy of Sciences, 1946–50.
Director, Johnson Research Foundation for Medical Physics, University of Pennsylvania, 1929–49.
Coordinator of Research, Office of the Air Surgeon, U.S. Army, 1942–46.

BIOGRAPHY OF JAMES HAROLD DOOLITTLE

American aviator, aeronautical engineer, and aviation executive.

Born in Alameda, Calif., on December 14, 1896. Son of Frank H. and Rosa C. (Shephard) Doolittle.

Education.—Grammar schools of Nome, Alaska, and Los Angeles, Calif.; Los Angeles Manual Arts High School; Los Angeles Junior College (1914–16); University of California (A.B. 1922); Massachusetts Institute of Technology (M.S. 1925—D.Sc. 1926).

Honorary degrees

University of California, doctor of laws; University of Michigan, doctor of engineering; Clarkson College of Technology, doctor of science; Brooklyn Polytechnic Institute, doctor of engineering; Waynesburg College, doctor of military science; Northland College (Wisconsin), doctor of laws.

Career

Served in U.S. Army Air Corps, 1917–30; manager, Aviation Department of Shell Petroleum Corp., and major, U.S. Army Air Corps Reserve, 1930–40; major, Army Air Corps, 1940; lieutenant colonel, 1941; brigadier general, 1942; major general, 1942; lieutenant general, 1944. Led the first flight on Tokyo, 1942; commanding general, 12th Air Force in North Africa, 1942; commanding general 15th Air Force in Italy, 1943; commanding general 8th Air Force in England, 1944; commanding general 8th Air Force in Okinawa, 1945. Vice president and director of Shell Oil Co.—vice president 1946–58, director 1946 to date. Effective January 1, 1959, board chairman of Space Technology Laboratories, Inc.

Appointments

Member, Army Air Corps Investigating Committee (Baker Board), 1934; chairman, Secretary of War's Board on Officer/Enlisted Men Relationships, 1946; member, Joint Congressional Aviation Policy Board, 1948; adviser to Committee on National Security Organization, 1948; Chairman, President's Airport Commission, 1952; Chairman, President's Task Group on Air Inspection—Stassen Disarmament Committee, 1955; Chairman, Air Force Scientific Advisory Board, 1955 through 1958; member, President's Board on Foreign Intelligence, 1955 to date; Chairman, National Advisory Committee for Aeronautics, 1956–58; member, Advisory Board, National Air Museum, Smithsonian Institution, 1956 to date; member, Defense Science Board, 1957–58; member, President's Science Advisory Committee, 1957–58; member of National Aeronautics and Space Council, 1958.

Achievements

First to fly across the United States in less than 24 hours (21 hours, 19 minutes), 1922; first to fly outside loop, 1928; first to take off, fly a set course and land without seeing the ground—thus pioneering the science of "blind flying," 1929; winner of Schneider Trophy race, 1925; winner of Bendix Trophy race, 1931 (Burbank, Calif., to Cleveland, Ohio); established new transcontinental record (11 hours, 15 minutes), 1931; winner of Thompson Trophy race (258.68 miles per hour), 1932; World's landplane speed record, 1932; Awarded Mackay

Trophy, 1926; Spirit of St. Louis Award, 1929; Awarded Harmon Trophy of the Ligue International des Aviateurs, 1930; Guggenheim Trophy, 1942; International Harmon Trophy, 1940–49; Wright Brothers Trophy, 1953; F.A.I. Gold Medal, 1954.

Decorations

Congressional Medal of Honor; Distinguished Service Medal with Oak Leaf Cluster; Silver Star; Distinguished Flying Cross with two Oak Leaf Clusters; Bronze Star; Air Medal with three Oak Leaf Clusters; Official Order del Candor de las Andes (Bolivian); Yon-Hwei, Class III (Chinese); Knight Commander, Order of the Bath (British); Grand Officer de la Legion d'Honneur and Croix de Guerre avec Palme (French); Grand Officer de la Couronne avec Palme and Croix de Guerre avec Palme (Belgian); Grand Commander (Polish); Abdon Calderon (First Class) (Equadorian).

Educational activities

Massachusetts Institute of Technology Corp., life member. University of California, member of Engineering Advisory Council, 1957 to date.

Associations

Honorary fellow, Institute of the Aeronautical Sciences (past president 1940); fellow, Royal Aeronautical Society; member: American Petroleum Institute; Society of Automotive Engineers; American Society of Mechanical Engineers; Air Force Association (past president 1946); National Aeronautics Association.

Clubs

Washington, D.C.: Army Navy; National Aviation.
New York City: Links; Lotos; Wings (past president 1955); Explorers; Boone and Crockett.
San Francisco: Bohemian.

Family

Married Josephine E. Daniels, December 24, 1917; sons: James H. and John P.

Office

Space Technology Laboratories, Inc., 5730 Arbor Vitae Street, Los Angeles, Calif.

REPRESENTATIVE SUBJECTS DISCUSSED BY THE NATIONAL AERONAUTICS AND SPACE COUNCIL

1. Transfers of projects and facilities to National Aeronautics and Space Administration:
   - (*a*) Project Vanguard.
   - (*b*) Project Saturn.
   - (*c*) Project Centaur.
   - (*d*) Project Tiros.
   - (*e*) Jet Propulsion Laboratory at Cal Tech.
   - (*f*) Army Ballistic Missile Agency.
2. International cooperation:
   - (*a*) United Nations Committee on the Peaceful Uses of Outer Space.
   - (*b*) Worldwide tracking network.
   - (*c*) Participation of foreign scientists in U.S. programs.
3. National space vehicle program:
   - (*a*) Scout.
   - (*b*) Delta.
   - (*c*) Agena.
   - (*d*) Vega.
   - (*e*) Centaur.
   - (*f*) Saturn.
   - (*g*) Nova.
4. Assignment of national priorities:
   - (*a*) Project Mercury.
   - (*b*) Project Saturn.
5. Long-range plans for the Nation's space program:
   - (*a*) NASA plans.
   - (*b*) Department of Defense plans.

6. Relationship of United States and Soviet space programs:
   (a) Comparison of scientific accomplishments.
   (b) Comparison of technology.
7. Organization and operation of the Nation's tracking and other ground support facilities:
   (a) Agreements between National Aeronautics and Space Administration and Department of Defense on support for specific facilities.
   (b) Project Mercury tracking network.

The CHAIRMAN. Mr. Moeller?

Mr. MOELLER. Dr. Phillips, the information that was gathered by the Space Council, and the results of their deliberations, were available for the advice of the President? Were they available to anyone else? Could the Secretary of Defense have had the advantage and the benefit of the advice and counsel of this group?

Mr. PHILLIPS. The Secretary of Defense was a statutory member of the Council, and as such did receive all of the advice, just as the result of his participation in Council activities.

In trying to answer your question in a general way, I think you must remember that this is advice to the Chief Executive, and as such it is within his province to decide who receives it in addition to himself.

Mr. MOELLER. But the Council made it available only to the President?

Mr. PHILLIPS. This was correct, yes.

Mr. MOELLER. That is all I have, Mr. Chairman.

The CHAIRMAN. Mr. Hechler?

Mr. FULTON. May I say for the record there, I think that is an excellent point Mr. Moeller has brought out.

The CHAIRMAN. Well, we will all agree.

Mr. HECHLER. I hope that didn't come out of my time. [Laughter.]

As a matter of executive privilege, these minutes of the Space Council are not available to Congress; is that correct?

Mr. PHILLIPS. That is correct, that is my understanding of this.

Mr. HECHLER. Under section 201, subsections (d) and (e) of the current act, it states that it will be the function of the Council to advise the President with respect to the performance of certain duties which are "to provide for effective cooperation between NASA and the Department of Defense, and resolve differences among the departments."

Now, did the President ever issue any directives as a result of the advice of this Council along the lines of those specific provisions of the act?

Mr. PHILLIPS. This is a difficult question to answer, because in the context of providing for this effective cooperation it does not necessarily require specific directives on the part of the President.

Mr. HECHLER. It certainly says specifically here "provide for effective cooperation between NASA and the Department of Defense and resolve differences among the departments."

Mr. PHILLIPS. That is correct.

Mr. HECHLER. Your function was to provide him advice so that he could perform this important function. Now, what I am trying to get at is that certainly in providing advice you were in a position to follow up whether he performed the function. Isn't that true?

Mr. PHILLIPS. I think the decisions that have been made by the President with regard to transfer of projects that were at the time of organization of NASA within the military departments, and the subsequent transfer of facilities such as the Jet Propulsion Laboratory at Cal Tech, this sort of thing, and the ABMA are representative of the coordination he effected.

Mr. HECHLER. On the transfer of ABMA, you did discuss that in the Council?

Mr. PHILLIPS. There was discussion in the Council.

Mr. HECHLER. Now, in subsection (f), the act reads, "The Council may employ a staff." You may recall in the drafting of the bill committees of the Congress were quite insistent that this wording be "shall" instead of "may." I think the unfortunate experience of the Council shows that the attitude of the Congress, perhaps, may have been justifiable, because the Council certainly did not employ a staff, did not carry out the permissive functions which Congress wanted to make obligatory; isn't that correct?

Mr. PHILLIPS. That is correct, there was no Executive Secretary appointed.

Mr. HECHLER. You were on the NASA payroll, were you not?

Mr. PHILLIPS. I have been on the NASA payroll.

Mr. HECHLER. All during the period?

Mr. PHILLIPS. Throughout this period, that is correct.

Mr. HECHLER. Don't you think this Council would have worked better if this individual had not been identified with an agency, but had been an individual on the payroll of the Executive Office of the President and appointed with the type of staff which is made permissive in the act?

Mr. PHILLIPS. There are two questions here. One is with regard to my separation from NASA, and as that relates to my duties for the Council. First of all, the first acting secretary of the Council was in fact a member of the staff of the Special Assistant to the President for Science and Technology.

He served from the organization of the Council up until January of 1959, at which time I assumed the responsibility as acting secretary. Whether or not my association with NASA in any way hindered my performance, detracted from it as secretary of the Council, is probably something you had best address to one of the members of the Council.

I was unaware of any difficulty created by this fact, since I was wholly responsible to the Council and its members, and during this period had no responsibilities to NASA at all.

Mr. HECHLER. I am certainly not criticizing you personally.

Mr. PHILLIPS. I understand that.

Mr. HECHLER. I mean I don't think the Council had a fair chance to really exercise the kind of authority and advice necessary in order to enable the President to make clear-cut decisions on these very, very important functions. I think it is going to be necessary to put someone up under the President who can exercise the authority necessary to resolve differences among the departments, as I have previously proposed before this committee. We need a Director of Space and Astronautics in the White House.

Thank you, Mr. Chairman.

The CHAIRMAN. Mr. Karth?

Mr. KARTH. No questions, Mr. Chairman.

The CHAIRMAN. Mr. Sisk?

Mr. SISK. Mr. Phillips, we have had quite a bit of discussion with reference to the CMLC, and the reason for the request to do away with that particular body. Most of the information that we have had has indicated it was generally bypassed, that it wasn't used. In fact, we had testimony to the effect that it was actually an unwanted Committee in the first place.

Now, do you feel that the Space Council has been bypassed?

Mr. PHILLIPS. No, sir, I do not.

Mr. SISK. In answer to an earlier question, you indicated that in doing the things which are required under subsection (e) of section 201 of the act, there have been many exchanges of information and solutions of problems, and so on. This testimony indicated to me that a great deal of this work had been done outside the Space Council.

Mr. PHILLIPS. I would hope in connection with the Council, or for that matter in the rest of our Government, that we would never try to so channel our exchanges of information and our decisionmaking as to require that all such matters that involve the space program had to go through the Council.

I think this would be unfortunate, if we were to so create what could very easily become a bottleneck kind of channel.

Mr. SISK. I was a member of the select committee, along with my good friend from Pennsylvania, and as I am sure he will agree with me when I say that we had some extensive discussions of this whole question of setting up this Space Council.

Now, I think it has somehow failed. It seems to me that your answers to some of the questions indicate that you believe that it has fulfilled its objectives, and therefore it is no longer needed.

Now, of the five things that are listed here under subsection (e) of section 201 of the act, who is going to perform those functions in the future without a Space Council or something that will take its place? The bill doesn't provide for anything to take its place, is that correct?

Mr. PHILLIPS. That is correct. These items under the present section 201(e) of the act are in themselves rather specific and detailed management and operational items in our space program, and I think it is quite proper that they should be the responsibility of the departments and agencies engaged in this program, namely, the Department of Defense and the NASA.

Mr. SISK. Many of us have felt that one of the things wrong with this whole setup is that we imposed upon the President of the United States duties and obligations above and beyond his capacity to perform. Now, will you agree with that?

Mr. PHILLIPS. That we were imposing upon the President too detailed requirements? Yes, I think this is the case, although may I add to this? I do believe in this very early period, when we were organizing this program, the President's attention to details of this sort was an important element in permitting it to be organized effectively.

Mr. SISK. There isn't any question that the President should and must give attention to these details. The point is that many of us visualized the Space Council, or some similar body, as a full-time working group that would really perform a valuable function. I am sure that if the President had the time to devote to it, he would be a

very fine member of the Council. But we felt that a man who has the biggest job on the face of the earth could hardly be expected to do all these things.

Let me ask this question: If, in listing the members, of the Council, the act had said the President or his designee, instead of just the President, would you think that might have helped in any way?

I notice you had eight meetings. Wasn't it a problem if you couldn't have a meeting without the President of the United States presiding?

The CHAIRMAN. Will the gentleman yield?

Mr. SISK. Yes.

The CHAIRMAN. As a matter of fact, there were eight——

Mr. PHILLIPS. Informal meetings.

The CHAIRMAN (continuing). Informal meetings for that purpose.

Mr. PHILLIPS. May I answer your question this way? We found the President was, to me, surprisingly available to this program. He has taken an interest in it, and granted that his schedule is a very busy one and there were occasions when we certainly had to adjust Council meetings to meet it, the number of meetings that we held of the Council was in no way a reflection upon his willingness to chair a meeting whenever the participants in the program felt it was necessary.

Mr. SISK. I appreciate that, and nothing I have said is intended to be critical.

Mr. PHILLIPS. I understand that.

Mr. SISK. The point is this: The Space Council is composed of the President of the United States, the Secretary of State, the Secretary of Defense, some of the top men in our Government, all of whom are loaded down already with work. Their jobs are mankilling. Some of us believed that to ask them to perform these functions in addition was asking entirely too much. I am still of the opinion that this probably is one of the reasons they would now like to abolish the Space Council.

Now, we wanted a committee that would be high in the councils of Government, a committee with prestige and with authority. My question is, do you feel that it could be worked out, and that the job could be done, without imposing upon these high officials the tasks that we have asked them to do?

The CHAIRMAN. The gentleman's time has expired.

Will you answer the question?

Mr. PHILLIPS. It would, of course, be possible to have an advisory committee of some sort, with some of these present members of the Council as members of that committee.

The CHAIRMAN. Mr. Miller?

Mr. MILLER. Mr. Sisk, Mr. Chairman, covered the field in which I was interested very well, so I have no questions.

Mr. FULTON. Would you yield?

Mr. MILLER. I don't think I can.

Mr. FULTON. For a question.

The CHAIRMAN. For a question—will you answer this question: You were Acting Secretary. The law provided for a Secretary. Why was no Secretary ever appointed?

Mr. PHILLIPS. I am really in no position to answer this question for you. This was a decision reached at the time of organization of

the Council, and it is my understanding a decision reached by the President.

The CHAIRMAN. Did you ever decline the job of permanent Secretary?

Mr. PHILLIPS. No; I did not. [Laughter.]

The CHAIRMAN. Mr. Fulton, you have a question.

Mr. FULTON. Your question was along the line I was going to pursue. There was never a permanent staff that was appointed on a permanent basis. There was simply an Acting Secretary who was the chief officer of the Council who ran the office; isn't that right?

Mr. PHILLIPS. That is correct.

Mr. FULTON. So you really had your foot half in NASA——

Mr. PHILLIPS. In fact, I did not have it half in NASA. I had no responsibilities to NASA during this period.

Mr. FULTON. So it was really a joint responsibility, and you didn't feel you were the Secretary, you were the Acting Secretary?

Mr. PHILLIPS. There was never any question about the fact that I was the Secretary of the Council. I was certainly not the Executive Secretary, the position that was called for in the act; that is correct.

Mr. FULTON. I agree with Mr. Sisk, that possibly the reason this has not worked out well was because our idea was never given effect. Our idea was to provide for a strong, permanent, professional staff that would come up with various papers and policies which were then screened on a very high level, so that the choices could be made. It was hoped that the Council would act as a right arm to the President. Without that, of course, you have simply had the various department heads meeting for discussion. Would you agree, Mr. Sisk?

Mr. SISK. I agree completely with the gentleman.

The CHAIRMAN. Will Mr. Phillips agree on that?

Mr. PHILLIPS. Certainly, had there been a permanent staff and permanent secretary, Executive Secretary, appointed, with a larger staff, any of you gentlemen who are familiar with Parkinson's law know that this would have provided more backup, probably more activity in this area. I am sure of that. I am not certain, from my experience with the Council, that this would necessarily have provided any more substantive matters for the Council to review.

The CHAIRMAN. I shall now recognize Mr. Hechler; and then, according to previous agreement, we will hear the Commissioner of the AEC.

Mr. Hechler.

Mr. HECHLER. Following up what Mr. Fulton was saying, with which I am in complete agreement, I believe that a permanent staff would have given more status to this council. The act, 201(f), stipulates the Executive Secretary is authorized to appoint and fix compensation of personnel, including not more than three persons, appointed without regard to civil service laws and compensated at the rate of not more than $19,000 a year, as may be necessary to perform such duties; namely, the staff.

Mr. PHILLIPS. Yes.

Mr. HECHLER. Was there ever any discussion about the appointment of these three top people which were so designated in the writing of the law to provide such a permanent staff, as Mr. Fulton was talking about?

Mr. PHILLIPS. I am unaware of any consideration given to the

formation of a permanent staff which would include these three people.

Mr. HECHLER. That is unfortunate.

The CHAIRMAN. Mr. Phillips, we want to thank you very much, sir, for coming here this morning and giving us the benefit of your valuable testimony. We appreciate it very much.

Mr. FULTON. Before we leave it, would you yield for another thing on Mr. Hechler's point?

Would you yield, Mr. Hechler?

Mr. HECHLER. Sure.

The CHAIRMAN. One more question from Mr. Fulton.

Mr. FULTON. Did you ever try to implement the provisions of the act by making a formal request that the staff be appointed in accordance with those provisions? What did you try to do as Acting Secretary? At that point you were head of it.

Mr. PHILLIPS. I made no recommendations to anyone to provide a permanent staff, as called for in the act. On the other hand, I felt that the personnel available to me from the various departments, and the support given me by the Executive Office of the President was sufficient for the activities of the Council.

Mr. FULTON. That is all.

The CHAIRMAN. Thank you very much, sir. We appreciate your testimony. Thank you very much, Mr. Phillips.

At this time we have the Honorable John F. Floberg, member of the Atomic Energy Commission.

Mr. Floberg, I have had the pleasure of knowing you for a long time. You have held numerous positions in Government; for a number of years you have been with the Atomic Energy Commission, and I think you have been doing a good job with the Commission. We are happy to have you here this morning.

Mr. MILLER. I think you should continue and let the record show that he was a distinguished Assistant Secretary of the Navy, and did a great job in that position.

The CHAIRMAN. He did a wonderful job with the Navy.

Mr. FLOBERG. Thank you.

The CHAIRMAN. Mr. Miller and I were on the Armed Services Committee at the time you were Assistant Secretary of the Navy. But I think Mr. Floberg is doing just as good a job with the Atomic Energy Commission.

You have a statement, and if you will proceed with the statement, the committee will appreciate it very much.

Mr. FLOBERG. Thank you, Mr. Chairman, and thank you for the kind words.

I will proceed to read this statement, but I welcome interruptions at any time, or questions at the end, whichever you prefer.

The CHAIRMAN. Knowing the group as I do, I would suggest that you get your statement in first. [Laughter.]

STATEMENT OF JOHN F. FLOBERG, A COMMISSIONER OF THE ATOMIC ENERGY COMMISSION

Mr. FLOBERG. All right, Mr. Chairman.

Mr. Chairman and members of the committee, I am very happy to appear before the committee in order to present the views of the

Atomic Energy Commission concerning H.R. 9675, the proposed amendment to the National Aeronautics and Space Act of 1958, as amended. My statement is generally addressed to those paragraphs of the bill in which AEC has an interest or concerning which the experience of the AEC may be of significant value.

THE ROLE OF ATOMIC ENERGY IN SPACE

First, however, I should like to discuss the contribution which we believe atomic energy can be expected to make to future space propulsion. Nuclear power has been recognized by most space experts as an important road to future space exploration. It is of importance to the Nation that a vigorous effort be devoted to research and development directed toward nuclear propulsion of space vehicles. The public hearings in 1958 before the House Select Committee on Astronautics and Space Explorations brought out the fact that nuclear rockets are capable of a specific impulse two and one-half times that of conventional chemically fueled rockets; specific impulse being a measure of rocket performance in pounds of thrust developed per pound of propellant flow per second. The success of the Kiwi A experiment, an actual high temperature reactor using hydrogen as a coolant, has supported calculations predicting a specific impulse of about 800 seconds for the Commission's first nuclear rocket engine, Rover. This compares to a theoretical limit for chemical systems of about 400 units of specific impulse. In addition, it is also reasonable to expect that normal growth in the state of art in nuclear rocket propulsion could achieve even higher specific impulses.

Aside from propulsion devices, nuclear energy is expected to play a very important role in furnishing auxiliary power to space vehicles. Our present space power requirements are extremely small when viewed in terms of the large payloads that will be placed in space in the next decade. In terms of weight, compactness, and unit cost, nuclear auxiliary power sources provides a most attractive means of providing large power requirements. Beyond a requirement of several kilowatts of electrical space power, nuclear power sources now appear to be the only reasonable means of furnishing space power over extended periods of time. Furthermore, if we look one step further to ion propulsion, as the future means to provide extended propulsive power in space, we are again led to nuclear power sources as the only reasonable means now known for providing the large electric power requirements for ion propulsion. This is because a minimum requirement of at least 30 kilowatts is still beyond the competitive range of nonnuclear power devices. It becomes apparent that the impact of nuclear energy in the future space role of this Nation will be of great significance and the Commission views its programs as an important part of the research and development responsibilities placed upon it by the Atomic Energy Act of 1954.

The Atomic Energy Act of 1954 authorizes and directs the Commission to conduct research and development activities relating to the utilization of atomic energy. Under this authority the Commission is engaged in a wide range of atomic energy applications, including the development of nuclear devices for use in the space program.

As a part of the AEC program to meet this responsibility, we are presently engaged in joint AEC-NASA efforts to develop nuclear power for the propulsion of space vehicles and joint efforts with both NASA and DOD for development of auxiliary power units for space vehicles. The development of such nuclear systems may eventually become a most essential element in this Nation's space program.

REPEAL OF SPACE COUNCIL

Paragraph No. 4 of the bill would repeal section 201 of the act, which provides for the National Aeronautics and Space Council, of which the Chairman of the Atomic Energy Commission is a member. The Atomic Energy Commission is in accord with the proposed repeal of this provision. Without relying on statutory provision for machinery such as the Council, the Commission and other executive agencies may provide advice to the President and the Administrator on the space program or other matters of concern within the purview of the executive branch.

CIVILIAN-MILITARY LIAISON COMMITTEE

Paragraph No. 7 of the bill would repeal section 204 of the act which provides for the Civilian-Military Liaison Committee. Because the Atomic Energy Commission is not involved in this provision of the bill, it is not in a position to comment respecting its enactment. However, we have been informally advised that the committee wishes to be informed as to AEC's experience with a Military Liaison Committee.

The Military Liaison Committee provided by the Atomic Energy Act of 1954, as amended, was covered quite fully in the testimony in 1958 before the House Select Committee on Astronautics and Space Exploration. General Herbert B. Loper, Assistant to the Secretary of Defense for Atomic Energy, and Chairman of the Military Liaison Committee, was a principal witness on this subject. In testifying before the Senate Special Committee on Space and Astronautics in May 1958 concerning S. 3609, the Commission reported on the usefulness of the MLC in the atomic energy program. I agree that the MLC has worked well as an orderly and effective channel of communication between AEC and DOD. In serving as the channel of formal communication between the Department of Defense and the Atomic Energy Commission the MLC has encouraged and facilitated informal contacts between agencies of the Department of Defense and the AEC at corresponding levels of interest, work, and responsibility. When he comes before this committee tomorrow, Brig. Gen. A. D. Starbird, Director of our Division of Military Application, will answer any questions concerning the way in which the MLC operates.

The success of the Military Liaison Committee under the Atomic Energy Act of 1954 does not necessarily mean that such a committee would be equally successful in a different situation.

COORDINATION AND COOPERATION

Paragraph No. 14 of the bill would add a new section 309, "Coordination and Cooperation." Where previous consideration of inter-

agency coordination and cooperation resulted in somewhat detailed organizational schemes in the National Aeronautics and Space Act of 1958, the new section 309 recognizes that related interests in space research activities may exist and that a degree of coordination and cooperation will be necessary. The bill discusses these interests only in terms of the Department of Defense and the National Aeronautics and Space Administration.

Though it is not specifically recognized by the bill, the Atomic Energy Commission is working on a number of applications of atomic energy to space vehicles. Project Rover, to which I previously referred, is a research and development program on nuclear propulsion for rockets. Technical work on Rover is centered at the Commission's Los Alamos Scientific Laboratory. The overall objective of this program is to demonstrate the feasibility of nuclear power for rocket propulsion. This objective is being approached through (1) the development of high power density nuclear propulsion systems, and (2) the development of reactor materials capable of withstanding high temperatures.

To provide meaningful milestones for the Rover project, a series of reactor experiments has been formulated. The first of this series, Kiwi A, was successfully completed last July, and from its results we have gained additional confidence and encouragement in our ability to meet this objective. This series of tests is being conducted at the Commission's propulsion reactor test area at the Nevada test site.

A second endeavor of the Commission is the development of systems for nuclear auxiliary power, commonly referred to as the SNAP program. In this program the Commission is developing compact, lightweight nuclear-electric auxiliary power units for use in space vehicles. Radioisotope-heated units and reactor-heated units are being tested in this program. This work for the development of atomic energy for application to space vehicles as well as that for the development of the nuclear system is under the direction of the Commission's Division of Reactor Development where it can share and benefit from other capabilities, resources, and technology in the reactor field. The work is being carried out in close cooperation with the Department of Defense and the National Aeronautics and Space Administration.

To assure that adequate and effective coordination of the program with the Department of Defense was achieved, several years ago there was established in the Commission's Division of Reactor Development a staff unit composed of employees of the Department of Defense and the Atomic Energy Commission. This staff, like several others set up by the Commission, such as the naval reactors group, was placed under one person to whom authority was delegated by the AEC and the Department of Defense. With overall program direction and leadership under one person, there was welded together a working staff under unified direction, with mutual attention clearly focused on common technical and administrative problems.

The establishment of the National Aeronautics and Space Administration and the transfer of work on certain nonnuclear components for the Rover project from the Air Force to NASA requires a modification of this arrangement.

We are now developing with NASA a plan to provide a single point of management for the nuclear powerplant program. A unified

staff will operate with respect to the so-called SNAP devices being developed for satellites and space missions of NASA.

The bill does not expressly recognize or provide for such joint development efforts by NASA and AEC nor by DOD and AEC. Because the bill is not specific on this point, it is conceivable that questions could arise between the Commission, in performing nuclear research and development for space applications, and NASA, in carrying out its space activities under the proposed law.

We have been assured, however, by the National Aeronautics and Space Administration that it was not their intent by provisions of their amendment to in any manner preclude the Atomic Energy Commission from carrying out its activities for research and development of nuclear propulsion systems and power sources for space application pursuant to its authority, that is, the Commission's authority, under the Atomic Energy Act of 1954, as amended.

The CHAIRMAN. Thank you very much, Commissioner Floberg.

You brought up several interesting points that we have not considered to date in our hearings. For instance, the last point you brought up was the question of cooperation among the Department of Defense, the AEC, and the Space Agency. The question is whether or not this act should continue to provide the Space Agency with a liaison committee. The law now provides for such an organizational setup. I have noticed, however, that men in the executive branch, from the bureaus on down, generally would rather develop their own organizations and not have Congress do it by law.

But in regard to the AEC, the law specifically provided the MLC, didn't it?

Mr. FLOBERG. Yes, Mr. Chairman.

The CHAIRMAN. And it has worked very well with that provision in the law?

Mr. FLOBERG. I believe that is correct. I don't believe it is necessary, however, to amend this particular bill to take care of this last point that I brought out. I wanted to emphasize it to the committee, and I think you might advert to it in your report, or something of that sort, but I don't believe that any modification of the draft of the act is necessary to cover this point I tried to make.

The CHAIRMAN. Now, on page 5 of your statement, you said that the success of the Military Liaison Committee under the Atomic Energy Act of 1954 does not necessarily mean that such a committee would be equally successful in a different situation. What you say may be true.

But do you see anything so different in the situation which now exists in reference to space that would make you conclude that a committee similar to the MLC would be unsuccessful?

Mr. FLOBERG. Well, the Military Liaison Committee has been successful, as I testified. At least in my opinion it has been successful. It has not always been uniformly successful. At times it has worked better than it has at other times. And I think that perhaps the peculiar history of the Commission is responsible for the success of the MLC here.

If you will recall, Mr. Chairman and members of the committee, the nuclear effort began as a military one in the Army, and when the

Commission was set up there was a strong military history behind all the activities that were transferred to the Commission.

The debate at that time as to how to organize the country's atomic energy effort took special consideration of the fact that the military interest was a primary one. Our law so states. That is evidenced by the establishment of the Military Applications Division in the Commission, which is headed, by statute, by a military officer on active duty. So the marriage between the Commission and the military is a very close one. I think that history, plus evolution, plus the fact that such a tremendous proportion of the Commission's effort is devoted to the Department of Defense's requirements, makes the MLC a peculiarly suitable agency for working together.

The CHAIRMAN. Do you see any difference in the state of affairs regarding the Space Agency?

Mr. FLOBERG. Well, while we work well, I believe, with the Space Agency, it must be admitted, Mr. Chairman, that the relative amount of our effort going into the Space Agency's primary interests is infinitesimal compared to the amount that goes into the military.

The CHAIRMAN. I think you have missed my point. I mean, do you see any relative difference between the situation which exists between the Department of Defense and the Space Agency and the situation which exists between DOD and the Atomic Energy Commission?

Mr. FLOBERG. I am not really enough informed on how those two agencies work together to answer your question intelligently, Mr. Chairman.

The CHAIRMAN. At least you don't see any difference at this time, although you say you are not informed on it?

Mr. FLOBERG. Theoretically, I don't see why it shouldn't be a similar situation, but I can't really respond to your question from knowledge.

The CHAIRMAN. Now, referring to this staff unit composed of employees of the Department of Defense and the Atomic Energy Commission, you seem to feel the need of such a unit. Might not the same type of thing be necessary to the Space Agency?

Mr. FLOBERG. It could well be. I brought this point out to illustrate the fact that the Naval Reactors Branch works through a unified staff that works as an Atomic Energy Commission office, but it is part of the Navy's overall establishment, too. It belongs to us but the Navy is intimately woven into it. The same thing is true in the case of the Aircraft Reactors Branch.

It must be confessed, though, Mr. Chairman, that these don't always work with uniform success. The Naval Reactors Branch has been much more successful than the Aircraft Reactors Branch.

The CHAIRMAN. One more question and I am through. In your high position as a Commissioner of Atomic Energy, would you recommend the abolition of the Military Liaison Committee?

Mr. FLOBERG. Most certainly not. In fact, in our peculiar circumstances, our job would be much more difficult without the MLC. In fact, I don't see quite how we could do it.

The CHAIRMAN. I don't see anything peculiar in your work there. While on the Armed Services Committee, I worked with General Groves in helping to establish your AEC program. We worked on the legislation. It doesn't seem to me to be especially peculiar.

Mr. FLOBERG. Maybe it is not—

The CHAIRMAN. But I do think it is working quite well.

Mr. FLOBERG. It is. Remember, Mr. Chairman, something like 75 or 85 percent of our effort is devoted to military requirements. Even there the MLC doesn't work with uniform success. I would say——

The CHAIRMAN. You would say that 75 percent for military purposes is temporary, wouldn't you?

Mr. FLOBERG. The proportion is——

The CHAIRMAN. And as time goes on, you will have a larger peacetime use?

Mr. FLOBERG. The proportion is constantly shifting, Mr. Chairman. If you will recall in 1954, the relative percentages were 100 percent military and zero civilian. So if I say——

The CHAIRMAN. Under General Groves it was certainly 100 percent military.

Mr. FLOBERG. Sure, and it was up until the 1954 act was passed. Since that time the percent of our effort that goes into the peacetime atom has been increasing gradually each year, and it is pretty hard to break these figures out, but I would say something like 15 or 20 or 25 percent of the Commission's effort can now be called peaceful uses of the atom.

The bookkeeping isn't of the kind about which you can be specific, but it is something like that. I would like to point out, in MLC, which has been successful, I think it has been more successful in the area of weapons than it has been in the area of reactors. I can't explain that, but even a successful agency has degrees of success.

The CHAIRMAN. Mr. Fulton.

Mr. FULTON. You would say that you would prefer the Military Liaison Committee that is now operating with the Atomic Energy Commission to the Civilian Military Liaison Committee that was set up by the Space Act, wouldn't you?

Mr. FLOBERG. I really am not well enough acquainted with the way that Committee has worked. I am sure that ours is a good concept. And as I say, theoretically I don't quite see why that wasn't, but apparently it wasn't.

Mr. FULTON. Then you would likewise say that you would approve it over the type of setup that had been under the old National Advisory Committee for Aeronautics, wouldn't you?

Mr. FLOBERG. Well, that was a little different kind of organization and that certainly was a successful one.

Mr. FULTON. I agree with that. But I am taking the next step. Do you like your own arrangement under the Atomic Energy Commission better than the old NACA arrangement, which is the basis on which we set up NASA?

Mr. FLOBERG. In the case of the atomic energy effort, the basic philosophical tenet was to divorce the atom from the control of the military. In the case of the old NACA, the NACA was directly responsive to the military because the military was a part of it; they sat on it, they were members of the Committee. And I think that that worked well, too.

I think this illustrates that organizations of different kinds can be successful.

Mr. FULTON. That is my point. Would you recommend that we extend the old NACA concept, rather than take up the Atomic Energy Commission type Military Liaison Committee?

Mr. FLOBERG. At the time that this act was originally considered, I must say our own experience would have inclined me toward a committee of the kind that was established in the space effort. Now, experience has shown that it hasn't been too good. It hasn't worked out, for whatever reason, and perhaps reorganization is necessary in order to delete that particular type of cooperation.

Maybe an NACA type of organization is a better one.

Mr. FULTON. Would you specifically recommend we have as an alternative that we go back to the old NACA-type organization, with the military directly participating?

Mr. FLOBERG. I haven't really thought that one through.

Mr. FULTON. Could you put a statement in the record on it?

The CHAIRMAN. If the statement is to go in the record, would you, Commissioner Floberg, send it in within the next few days? It holds up our record when the statements are delayed, as they have been in many instances.

Mr. FLOBERG. Let me give that a little thought, Mr. Chairman, and I will try to provide a responsive answer to Mr. Fulton's question.

(The information requested is as follows:)

ATOMIC ENERGY COMMISSION,
Washington, D.C., March 31, 1960.

Hon. OVERTON BROOKS,
Chairman, Committee on Science and Astronautics,
House of Representatives.

DEAR MR. BROOKS: When I appeared before the Committee on Science and Astronautics of the House of Representatives on March 21, 1960, Mr. Fulton asked me whether I would recommend an NACA type of organization for the space agency. You will find my commitment to submit a statement for the record on the point, and I ask that this letter be treated as that statement.

After thinking through the question, it is my view that it would not be the best idea to have an NACA type of organization, with the military services actually members of the management, run the space program. I believe that the space program is much more civilian than military in its implications. My belief that the military interest in it, while substantial, is definitely secondary leads me to the conclusion that having a management as heavily loaded with military representatives as was the old NACA might lead to giving a disproportionate weight to the interest of the military services in management of the space program.

I do not mean to imply that the military services do not have a keen interest in the success or failure of NASA efforts, but rather that I think the relationship between the two should simulate a partnership basis as it does between the Department of Defense and the Atomic Energy Commission. The question then becomes one of coordination and cooperation, which in turn depend on leadership and attitude.

At the time that the organization of the space program was being debated, it was my view that the best way to handle it was through a new agency rather than by grafting the space responsibilities on to any existing one. NACA had been highly successful over the years, and it is my belief that the first rule of organization is the simple-minded one of not letting concepts of management orthodoxy disturb organizations which are working well. I still have a feeling that I may have been right, but I think the time has passed to debate that subject.

I trust that these comments will be of use to the committee, but I am at the convenience of the committee if I can be of further service.

Sincerely,

JOHN F. FLOBERG, *Commissioner.*

Mr. FULTON. I am due to quit at 13 after.

You have mentioned the fact that your nuclear propulsion developments for Navy purposes was put under one person. Of course, that is Admiral Rickover. Now, I am interested in saving atomic nuclear

teams and scientific teams that are developed in this country and using them on other projects. I am interested not only because the scientists who developed components of the nuclear submarines are living in my district in Pittsburgh—Westinghouse Electric—but I am also interested in seeing that these teams around the country are not disbanded.

Now, information from my district is that Westinghouse Electric is laying these people off because the nuclear submarine components program is rounding off. Why aren't those people kept, and why isn't your program broadened so that we in America can be the first to have a nuclear rocket in space, a nuclear satellite or a nuclear space vehicle? So my question is: Is the United States going to be first with these three items in space? What is the calendar on them? What is the calendar of Russia on them?

And the last question is: Why are we disbanding these teams, and having these people move from supporting scientific investigations in the laboratory to house painting? I know of a case in my district.

Mr. FLOBERG. Well, I think I can respond to those questions, Mr. Fulton.

Mr. FULTON. That is all.

Mr. FLOBERG. This team that you refer to isn't being disbanded. It is true that some of the edges are being trimmed a little bit.

Mr. FULTON. Why don't you put Rickover in charge of this nuclear rocket program, and say "Look, go ahead and let's be first." You see, why don't you do just the same thing again?

The CHAIRMAN. You had better let him answer your other questions. You have asked about four questions already.

Mr. FULTON. Why don't you move aggressively, that is my point.

Mr. FLOBERG. I believe we are moving aggressively. We surely know Admiral Rickover is an aggressive mover, but he is not the only aggressive mover. And I think we have a pretty good program in this nuclear rocket business. Now, the fact that some of these people are being attrited from the effort in your district, Mr. Fulton, doesn't mean that they are being lost to the nuclear energy effort. A lot of them are being picked up very quickly. They are people of skill, and there are places for them.

The skilled ones will be utilized in the effort.

Mr. FULTON. The team is being destroyed.

Mr. FLOBERG. No; it is not being destroyed. It is being shrunk by a very small percentage because the nature of the work has changed in that particular effort. The effort has become a more mature one, as time has gone by, as it may be expected to become, as a matter of fact.

Mr. FULTON. I have to stop. Are we going to be first with the nuclear rocket?

Mr. FLOBERG. I have no reason for doubting that we will. I think that our calendar is a reasonably good one.

Mr. FULTON. When?

Mr. FLOBERG. And like all other long-range development programs, it is hard to be specific about it. But we have no reason for thinking that anybody else is farther along in this area than we are. In fact. I am pretty sure nobody else is. Now, we would continue with a vigorous effort whether we thought they were or weren't, and we

intend to do so. But I think that we have no knowledge at this time on which to base any assumptions that we are going to be as far behind on nuclear rockets as we are with conventional ones.

The CHAIRMAN. Mr. Miller?

Mr. MILLER. Mr. Floberg, as I read your statement, you believe that this nuclear group under Admiral Rickover has been highly successful—but this is done administratively, pretty much, isn't it?

Mr. FLOBERG. That is correct.

Mr. MILLER. In other words, you and the Department of Defense got together and he wears one hat with them and one hat with you?

Mr. FLOBERG. This has been an arrangement between the Navy Department and the Atomic Energy Commission.

Mr. MILLER. And you have done that in other cases, have you not?

Mr. FLOBERG. In the case of the Aircraft Reactors Branch, there is a similar organization.

Mr. MILLER. Somewhat similar organization; you have to meet personalities, and you have to meet certain intangibles, and it is pretty hard to define; and when you try to write these things into law, doesn't it have the tendency to retard rather than to contribute to the work you are doing?

Mr. FLOBERG. It certainly has a tendency to inhibit flexibility, and I think in these cases it has worked well without statutory language behind it.

Mr. MILLER. And you need flexibility in this field where we don't know what tomorrow holds; you have to play the thing pretty much by ear as you come up with new developments.

Mr. FLOBERG. In the case of that kind of organizational problem, my answer is "Yes, I believe we should." I agree with the chairman, that some organizational skeleton must be reasonably firm, but I think that is one step beyond where I would have it in the statute.

Mr. MILLER. After you get to the point where you have development, then you can set these things up. Perhaps we can contribute much to the program with the absence of law tying down these things, and depend instead on the people who have to do the job, giving them some flexibility, and having confidence in them, and not loading them down with committees and hard and fast rules.

Mr. FLOBERG. That has been true in those cases.

The CHAIRMAN. Maybe we need a former Assistant Secretary of the Navy.

Mr. MILLER. Is that taken out of my time now? [Laughter.]

The CHAIRMAN. We will allow 20 seconds for that.

Mr. MILLER. I am going to close right now. I just want to call Mr. Fulton's attention to the fact that I was much more generous with the committee than he was.

The CHAIRMAN. Now, Mr. Riehlman?

Mr. RIEHLMAN. Mr. Floberg, you have referred to the successful operation that has been carried on between the Military Liaison Committee and the Atomic Energy Commission. How many people compose that Committee?

Mr. FLOBERG. The Committee is made up of—there are seven members of that.

Mr. RIEHLMAN. How many are from the Atomic Energy Commission and Department of Defense?

Mr. FLOBERG. These are all from the Department of Defense.

Mr. RIEHLMAN. All from the Department of Defense?

Mr. FLOBERG. That is correct.

Mr. RIEHLMAN. None are from the Atomic Energy Commission?

Mr. FLOBERG. No; but they confer with the Commission, with the full Commission, on a monthly basis, not completely regularly, but pretty regularly, and they of course have constant contact between the Military Liaison Committee and the Commission's top staff.

Mr. RIEHLMAN. Well now, the Committee has no authority of any kind to act?

Mr. FLOBERG. Well, it does not have authority in the sense it doesn't have authority to direct the Commission, but it has responsibility for the preparation of the Military requirements, for example, within the Pentagon, and it has authority over the services in the sense that it scrutinizes and validates their requirements.

Mr. RIEHLMAN. Supposing there is a disagreement between this committee and the Atomic Energy Commission, where is this resolved?

Mr. FLOBERG. Well, we have frequent disagreements, but we always work them out, Mr. Riehlman. I think that good faith and commonsense and flexibility of people has meant that there haven't been any problems, certainly since I have been on the Commission, that weren't capable of resolution. I suppose that if we came to an absolute impasse with the Military Liaison Committee, which is really made up of subordinates of the Secretary of Defense, and it couldn't be resolved between the Commission and the Secretary of Defense, the President would have to decide that.

Mr. RIEHLMAN. The President?

Mr. FLOBERG. Yes, sir. But there has been no such case that I can recall.

Mr. RIEHLMAN. Well, now, going over to our interest, and particularly dealing with NASA and your relationship with NASA, I think your statement relates that at the present time you have very good relationships with NASA.

Mr. FLOBERG. I believe it has been good, yes.

Mr. RIEHLMAN. Now, do you have a committee or a group of people who are constantly in contact with NASA, where you have free flow of information as to their needs?

Mr. FLOBERG. Well, there is a contact between our staff level people and the NASA staff and the Commission, itself, has met with Dr. Glennan and his chief assistants on one or two occasions. There is no official committee or anything that has any charter or anything like that between us and NASA, but the people in our Aircraft Reactors Branch are in constant contact with the NASA people regarding the mutual problems.

Mr. RIEHLMAN. You have two programs which of course NASA is vitally interested in—one is the ROVER program, and the other is SNAP?

Mr. FLOBERG. Yes, sir.

Mr. RIEHLMAN. Do you feel that without a committee that has some authority to direct these activities, that these programs can be worked out satisfactorily between NASA and the Atomic Energy Commission?

Mr. FLOBERG. Yes, I don't think any formal committee is necessary to resolve that problem, Mr. Riehlman. I think that the informal

constant contacts would be adequate to resolve any clashes of approach between the two. Actually, you will recall in my testimony I said that in the case of the Military Liaison Committee, that committee hadn't taken too much interest in the military reactor part of their responsibilities. The naval reactors program, for example, although it comes under the Military Liaison Committee's jurisdiction, has worked pretty much on a direct Navy-AEC basis, because Admiral Rickover has been the focal point of it.

I believe that that kind of arrangement is enough to protect the good working relationships between NASA and the Commission.

Mr. RIEHLMAN. That is all, Mr. Chairman.

The CHAIRMAN. Mr. Sisk?

Mr. SISK. Mr. Floberg, by any chance have you had an opportunity to read the testimony that General Branch and Colonel Armstrong gave to this committee?

Mr. FLOBERG. I haven't read the testimony, no. I saw the press reports.

Mr. SISK. Well, then you probably will be familiar with the subjects of my questions. Now, I agree with the statements made by the gentleman from California, my colleague, Mr. Miller, with reference to giving you all the flexibility that is necessary. If these things can be done administratively, I think that is the ideal way to do them. But in your answers to Mr. Riehlman's questions, it is my understanding that you have not set up any particular committee or any staff unit, to exchange information between the Atomic Energy Commission and NASA. Is that correct?

Mr. FLOBERG. That is correct, but I don't believe it has hindered the exchange of ideas between us and NASA. I don't believe the absence of any formal group has hindered the exchange of ideas.

Mr. SISK. The statements of General Branch and Colonel Armstrong indicated that they felt that what AEC had accomplished had not been utilized and adapted to a launch vehicle by NASA. This would indicate to me that there has been a breakdown, Commissioner Floberg.

Mr. FLOBERG. Well, I think, if I interpret your question correctly, Mr. Sisk, you are indicating that General Branch and Colonel Armstrong felt that NASA had not been sufficiently enthusiastic in their attitude toward the contribution that the nuclear art can make to the space program. I think we all feel that way, but we can't compel NASA to use our thoughts, to use them to a greater extent than they already are using them. We can think that they are wrong about something, but I don't see how a formal committee can change that.

Mr. SISK. I agree, and I certainly would not want to give to the Atomic Energy Commission the power of forcing NASA officials to do anything. But I share with my colleague from Pennsylvania, Mr. Fulton, a very strong feeling that we have within our grasp the opportunity of achieving some outstanding breakthroughs in this space field, not only from the standpoint of world prestige, which it would give us, but real, concrete achievement.

Now, it seems to me that the information we have been given in testimony reveals that there isn't sufficient coordination and correlation of the work between AEC and NASA with the possibilities which exist and the benefits which could accrue to the United States in

the development of the space program, this should be pushed much harder. Now, I realize this becomes a matter of opinion, but that is the thing that is a real concern to me.

Let me put a question in this form: Your discussion of this staff unit which you have developed composed of employees of the Department of Defense and the Atomic Energy Commission, would you recommend such an organization as that as between the Atomic Energy Commission and NASA?

Mr. FLOBERG. Yes, I think that is all right, but I don't believe it should be a statutory thing, Mr. Sisk, in the sense that I think you have in mind. If you are asking me do I think that the coordination and cooperation between the Atomic Energy Commission and NASA has been as good as the coordination between the Atomic Energy Commission and certain other agencies, then I would say on a comparative basis it probably hasn't been.

I don't believe that this is a result of organizational deficiency. I think that this is a matter where we just have to do a better job, and so does NASA, but I don't believe that you are going to change this with words in this statute.

Mr. SISK. I am inclined to agree with you. But who is the person to initiate the setting up of this particular type of unit? Can you do it?

Mr. FLOBERG. Not I personally, because we Commissioners, you know, are all five equal Commissioners, under the law, but the Commission can.

Mr. SISK. I appreciate that.

Mr. FLOBERG. The Commission can. And with the cooperation of NASA, the same as we set up the Naval Reactors Branch with the cooperation of the Navy Department.

Mr. SISK. Let me ask you this question—I am not trying to put you on the spot——

Mr. FLOBERG. You can put me on the spot, Mr. Sisk, I don't bother.

Mr. SISK. Would you personally be interested in initiating such a thing? As I understand you, you believe this might be a good thing.

Mr. FLOBERG. I would be willing to give that a try, yes, sir.

Mr. SISK. Someone is going to have to initiate this, and I have a feeling it may have to come from your side of the fence. I am not trying to press you too hard.

Mr. FLOBERG. Go ahead, you press me; I can't be embarrassed.

Mr. SISK. I would like to see something done along this line, and I would prefer to see it done by administrative action rather than by law. Could you foresee anything in this line in the future?

Mr. FLOBERG. Yes. This is actually the way the line of thinking is running now. What might happen I can't predict, but I think this is the direction in which most people are thinking at the present time.

Mr. SISK. It seems to me that the No. 1 problem to be solved right now is which comes first, the chicken or the egg. We discussed these matters with General Branch and his people, and then in turn with NASA. On the one hand the Atomic Energy Commission says "We have certain things available and we are waiting for a requirement for this particular type of vehicle or engine." On the other hand, NASA says "We can't begin to build a vehicle until we have the re-

quirements from AEC for the engine." Somewhere there needs to be some real coordination, don't you agree with me?

Mr. FLOBERG. Yes, sir; I certainly do.

Mr. SISK. I hope, Mr. Floberg, that you will take that initiative among your Commissioners and see what we can do about that.

Thank you.

The CHAIRMAN. Mr. Hechler.

Mr. HECHLER. I certainly concur with my colleagues on this committee on the necessity for action. If nothing else comes out of this committee, I hope that this action takes place.

What we need is not coordination, but leadership in this particular field.

Mr. FLOBERG. That is what you always need, Mr. Hechler.

Mr. HECHLER. Would you care to add anything as to how we can speed the production of that type of leadership that will mean that this program will move forward with the utmost urgency?

Mr. FLOBERG. I suppose we ought to flagellate ourselves ever once in a while and try to move a little quicker. I can't think of anything within the confines of this proposed bill that reflects directly on that. I might say that organization is never as important, in my judgment, as the people who are in the organization. All these charts we have with the names in the boxes, and so forth, it doesn't make much difference to me the way the lines run; the important thing to me is whose name is in the box.

I can recall when I was in the Pentagon, the two favorite indoor sports were redraft of charters and redrawing organization charts. They are nothing more than sports.

Mr. HECHLER. Would it help any, in the relations between NASA, the Department of Defense, and the Atomic Energy Commission, to have someone in the Executive Office of President who could provide the necessary spark of leadership and direction?

Mr. FLOBERG. It would be my opinion that it would encumber it even more. I think it is better to leave it to the agencies, and the agencies should do an ever-improving job, and if they don't, this committee is sitting up here and you have a right to ask why they aren't.

Mr. HECHLER. I don't want to inhibit flexibility, but I can't understand how Congress can prudently appropriate money for projects which are funded by several different agencies without knowing how they are going to be coordinated. It puts us in a pretty tough position to appropriate the money when we don't know how this coordination is going to be achieved.

I prefer to use the word leadership.

Let me shift quickly to one other question. Does the existence of the Military Liaison Committee that you described preclude the Atomic Energy Commission or the Department of Defense from liaison contacts at other levels up and down the line?

Mr. FLOBERG. Certainly not. There are constant contacts all through the organization.

Mr. HECHLER. You mean between specialists' work and on scientific and technological problems?

Mr. FLOBERG. Yes, sir, lots of examples of that.

Mr. HECHLER. I am glad you said that, because I couldn't quite get it when several people came up before our committee and testified

and said that if you funnel these all through one committee like the Civilian Military Liaison Committee, why, it would mean that it will inhibit the constant interchange and interflow of information, but you have given us a very good example of why that does not occur. I am awfully glad you made that statement, because I think this is just setting up a strawman when others say that a clear-cut channel will inhibit other liaison contacts.

Mr. FLOBERG. For formal Pentagon positions on problems, or anything of that sort, the Military Liaison Committee has the authority to express the Pentagon's point of view, just as does the Secretary of Defense.

Mr. HECHLER. I don't want to put you——

Mr. FLOBERG. But for informal contact there is a constant flow of contact.

Mr. HECHLER. I don't want to put you in the position of arguing with Dr. Glennan and Dr. York, but I would just like the record to show that I disagreed with them in saying that such a formal committee would inhibit other contacts, because I think the experience that you have shown in the Military Liaison Committee has refuted that contention.

Mr. FLOBERG. It has in our case, but maybe our business is just enough different to make a different case.

Mr. HECHLER. Thank you.

The CHAIRMAN. Mr. Daddario?

Mr. DADDARIO. You have said that your programs have demonstrated the feasibility of nuclear power for rocket propulsion. Following Mr. Sisk's line of questioning, which I think gets to the nub of this, you have also said that you cannot force NASA to take what you believe is a good program and adapt it to their use——

Mr. FLOBERG. You cannot and should not be able to.

Mr. DADDARIO. Cannot and should not. Now, can we assume that the Russians also are working on nuclear power for space propulsion?

Mr. FLOBERG. Oh, I would assume they are. It is a pretty obvious conclusion.

Mr. DADDARIO. Can we assume, too, that they are in the same general area of development as we are, that they have the same abilities that we have in this area?

Mr. FLOBERG. Well, they have skilled people, and if they chose to concentrate them on this kind of effort, I suppose that they could make the same kind of progress as we can make. They have never published anything about their effort in this line. They have been pretty quiet about it.

Mr. DADDARIO. If we can assume that, and if we can assume that they are coordinating their activities better than we are, there is also the possibility that they can achieve a greater effort in this field than we can in a shorter period of time.

Mr. FLOBERG. You have accumulated a good many assumptions, but I think if you did accumulate them you can come to that conclusion, yes, sir.

Mr. DADDARIO. I think we should accumulate assumptions. I think it is reasonable to do so. We have seen them make greater efforts in the past. For example, we are all in agreement that they have a thrust capacity greater than ours.

Mr. FLOBERG. That is in chemical rockets.

Mr. DADDARIO. Yes. If they were to coordinate their efforts better than we do, and if they come out with nuclear propulsion in this field before we do, it will be another great and spectacular breakthrough for them. This would not only give them capacity in this field, but would also give them a great propaganda advantage.

Mr. FLOBERG. I certainly think you are right.

Mr. DADDARIO. Don't you think, taking all those assumptions together, that perhaps we ought to coordinate our activities in space better with our nuclear developments?

Mr. FLOBERG. Well, I think we ought to do the very best job of coordination that we possibly can in this area, and I think that to the extent that we aren't up to par in this we ought to come up to par.

Mr. DADDARIO. Do you think we are doing the best job of coordinating?

Mr. FLOBERG. I think we probably can improve it.

Mr. DADDARIO. You think it ought to be improved?

Mr. FLOBERG. I sure do. I think everything like this has room for improvement in it, and I am sure this program does.

Mr. DADDARIO. That is all.

The CHAIRMAN. Mr. McDonough?

Mr. MCDONOUGH. Well, I appreciate your point of view on this legislation. It seems to me you are saying that the penalty ought to be for lack of coordination rather than write into this legislation how it should be accomplished.

Mr. FLOBERG. I don't think that legislation should ever go into detail to the extent where the agency has no ability to adjust to changes in the situation, or anything of that sort.

Mr. MCDONOUGH. The presumption, of course, is that all departments would exchange with each other all the information they have with the object of accomplishing the ultimate as quickly as possible?

Mr. FLOBERG. Yes, sir.

Mr. MCDONOUGH. If we set up an advisory council and specify their duties, that would be a limitation, whereas if we say in this legislation that the objective is complete cooperation on the part of all agencies involved, then if there is any evident lack of cooperation on the part of any one agency with another, that should be the time when the Executive comes into the picture and determines why there was a lack of cooperation.

Mr. FLOBERG. That sounds right to me.

Mr. MCDONOUGH. That is what you are saying here.

Mr. FLOBERG. That sounds right to me. I think that there is some point in organization where you get beyond the rigid framework and come into the more flexible framework. Just exactly where that point is is open to dispute. But generally speaking, I think I concur in what you said, Mr. McDonough.

Mr. MCDONOUGH. I appreciate your testimony. That is all.

Mr. FULTON. Would you yield?

Mr. MCDONOUGH. Yes; if I haven't used my time.

I yield to Mr. Fulton.

The CHAIRMAN. You yield for a question.

Mr. FULTON. All right; this is a question. I don't think that the occasion should pass without a definition of the word "flagellate." The witness has said we should flagellate ourselves, and I think Mr. McDonough, in a side comment to me, has very adequately described it in Navy lingo. Mr. McDonough says it means "Let's wave the flag and then get down to work."

The CHAIRMAN. Mr. Moeller.

Mr. MOELLER. Commissioner Floberg, on page 8 of your statement, you alluded to a weakness in this bill. However, in the last paragraph you also touch on the fact that you have been assured by NASA that they have no intent of preventing your Commission from carrying out research activities, et cetera. Now, this is, of course, with the current personnel. The situation could change, however, a few years hence.

Of course, Congress could do something about it.

Mr. FLOBERG. Congress could do something about it right now.

Mr. MOELLER. That is what I was going to say. Do you think maybe it would be wiser if this provision were spelled out for you immediately?

Mr. FLOBERG. I don't think you have to do any more than make a note in your report that you are not amending the Atomic Energy Act in this bill, you are just providing for amendment to the Space Act.

Mr. MOELLER. My only concern is that possibly at some future date you would find yourself in the difficulty——

Mr. FLOBERG. I think the committee report could settle that question right now.

Mr. MOELLER. Just the committee report would be sufficient?

Mr. FLOBERG. Yes, sir.

Mr. MOELLER. That would satisfy you and your Commission?

Mr. FLOBERG. Yes, sir. I think a sentence in the committee report would be enough to make sure that this was not a repeal of any portion of the Atomic Energy Act.

Mr. MOELLER. That is all, Mr. Chairman.

The CHAIRMAN. Mr. King?

Mr. KING. Mr. Floberg, coming back to the beginning of the Atomic Energy Commission, when Congress decided to program a big atomic energy development, they decided to set up the Atomic Energy Commission on the commission plan with five commissioners and a chairman. When they wanted to program a space effort they set it up as an administration with an administrator.

I am curious as to why they adopted these two patterns. Do you think the difference is significant?

Mr. FLOBERG. Well, as to why they chose the two different patterns, I suppose a Member of Congress is better capable of answering that question than I am, Mr. King. But, there are some obvious differences in the nature of a commission organization, as compared to an administrator organization. I suppose that the difference, as you look back in history—although I would be subject to correction on this on the basis of the record—is that nuclear energy was such a mysterious and relatively unknown field of science at the end of World War II, and it seemed to have so much potential strength in it, that the Congress felt reluctant to turn this over to a one-man organization. I imagine that the protection of having five commissioners

was an important part of the cumulative responsibility that the Congress sought to delegate to this agency at that time.

And I would think that under the circumstances that then existed, this was not an unreasonable analysis. Now, in the 1954 act, when the original act was substantially amended, this part was not changed. I assume that the same kind of logic still persisted in 1954. There is one further thing that became part of the Commission's responsibility in 1954, and that is the licensing responsibility. This was the origin of the—this 1954 amendment was the origin of the peaceful atom program, and as you are well aware, anybody who employs the atom in a peaceful application must be licensed by this Commission to do so.

I presume that the Congress thought that it was unwise to have a licensing authority in the hands of an individual.

Mr. KING. Well, is the only essential difference between the administration form and the commission form simply that the one has five persons at the head and the other has only one?

Is it that simple?

Mr. FLOBERG. Well, there are a lot of things to be said about a commission form of organization, too, and I might say that as time goes by I think that some parts of the commission's program convince me that the commission form of responsibility has been obsoleted by the development of the program. I am not sure that it is still a good idea to have a commission, except for the fact of this licensing authority.

I don't see how that can be put in the hands of one person.

Mr. MILLER. Would the gentleman yield?

Mr. KING. Yes.

Mr. MILLER. Through the years, reorganization plans have been adopted, and those agencies of government that were originally commissions with decisionmaking authority have been pretty well abandoned. The Civil Service Commission, where you have an administrator with a commission that is purely advisory and takes no part in decisions, the Civil Service Commission has had nothing to do. They can tell the chairman of the commission, who is really its administrator. They can advise him, but their authority ceases there, and that has been true with a lot of other commissions.

Mr. FLOBERG. The Atomic Energy Commission has followed the pattern of the other administrative agencies around town. There is the Securities and Exchange Commission, National Labor Relations Board, Civil Aeronautics Board, the Commerce Commission, and so forth. The Atomic Energy Commission is set up in more or less that same pattern because we have a promotional and a regulatory responsibility, as do they.

I have long had some pretty strong views, Mr. King, on the unification of the promotional responsibility and the quasi-judicial responsibility in a single agency. I had these views before I came with the Atomic Energy Commission, and I must say that 2½ years on the Atomic Energy Commission have reinforced those views, rather than modified any of them. I would change all of these agencies if I were a Member of Congress, or had the position that you have.

Mr. KING. My time is about up. Let me pursue one point, if I may. You say that the fact that the Commission has to license per-

sons suggests in itself the value of having a commission, because it is quasi-judicial in functions?

Mr. FLOBERG. Yes, sir.

Mr. KING. Doesn't the Administrator of NASA have quasi-judicial functions when you come to the matter of contracting?

Mr. FLOBERG. That is not what I had in mind. Contracting is a promotional responsibility.

Mr. KING. But going a step beyond that, in the course of contracting there comes the question of who will get the benefit of the patents that may arise from the work done. That, of course, is a big problem that is before Congress right now. But under any theory that we follow, or any of the available theories that are now before us, it is going to leave the Administrator with a tremendous amount of authority in deciding whether the contractor gets the patent or whether the patent remains with NASA.

Mr. FLOBERG. I am not reluctant to leave that authority in the Administrator.

Mr. KING. You can see some essential differences between that situation, on the one hand, and the function of the Atomic Energy Commission on the other?

Mr. FLOBERG. It is the difference between that and licensing somebody to construct or operate a reactor, for example, or licensing somebody to use isotopes in a research or medical application. I think there is a difference.

Mr. KING. What you are saying is that where the head of an organization has quasi-judicial functions that involve licensing, as you mentioned, where a matter of discretion must be exercised with delicacy, that it suggests the advantage of a commission type of organization?

Mr. FLOBERG. Yes. You have to immunize the granting of a license from political involvement, and I think that the fact of a multiple-person agency does tend to immunize it. As I say, I have pretty strong views on this whole thing, Mr. King, and I have long been a proponent of the administrative court concept, and still am, and I would revise all the administrative agencies in Washington with a general overhaul, but I wouldn't pick out one to do it.

Mr. KING. Fine. I have appreciated your discussion. You have clarified that point. Thank you.

Mr. FLOBERG. I am before the wrong committee to plead that case. I have to go before Mr. Harris' committee to discuss that angle.

Mr. KING. I understand.

The CHAIRMAN. Some of the testimony which you have given reminds me very much of the saying that it is better to have a poor law well administered than it is to have a good law poorly administered.

Mr. FLOBERG. I certainly agree with that.

The CHAIRMAN. You agree with that?

Mr. FLOBERG. I certainly do.

The CHAIRMAN. You would leave, therefore, the details out of any law with the idea that you would hope to get good administration, and that good administration in turn would fill in for any omissions that might have been made in the law, that is, where the law had set forth details?

Mr. FLOBERG. Mr. Brooks, there must be a thousand ships in the Navy, and the captain of every one has exactly the same responsibility, but the ships vary tremendously in quality.

The CHAIRMAN. But there is this difference: You have experience with the Navy's ships to draw on. Men have had thousands of years of training and experience in handling ships, both merchant ships and military craft. But we don't have experience in space. And now, 2 years after the law was adopted, we are told that two important features of the law are not working. And we are asked to abolish the CMLC and to let the Administrator of NASA take care of liaison with DOD; isn't that about it?

Mr. FLOBERG. Between us and NASA, I think that is correct; yes, sir.

The CHAIRMAN. No; between the Department of Defense and NASA.

Mr. FLOBERG. I am just not expert enough to really give you good advice on that, Mr. Brooks.

The CHAIRMAN. You are not an expert on the Department of Defense?

Mr. FLOBERG. I know pretty much about the Department of Defense.

The CHAIRMAN. I think you should.

Mr. FLOBERG. But I can't tell you why the Civilian-Military Liaison Committee has not worked, if it hasn't worked. I can't tell you that because I have not been a party to that part of the organization.

The CHAIRMAN. If we should establish the same organizational setup that you have in the Atomic Energy Commission to replace the Civilian-Military Liaison Committee, would you see any reason why it shouldn't work for NASA?

Mr. FLOBERG. As I said before, if I had been sitting on your committee when this bill was first considered last year, when the Space Act was first considered last year, I think I would have been impressed by the successful experience of the Atomic Energy Commission and I would have done the same thing you gentlemen did.

The CHAIRMAN. When you refer to Department of Defense, do you mean not only the Office of the Secretary of Defense but the military departments as well?

Mr. FLOBERG. I was thinking of the whole organization.

The CHAIRMAN. The whole organization.

(Mr. Floberg nods.)

The CHAIRMAN. So your answers would be the same regarding the Army, Navy, and Air Force as they have been for Department of Defense?

Mr. FLOBERG. I believe so, Mr. Brooks.

The CHAIRMAN. Are there any further questions?

If not, we want to thank you very much for your very fine testimony, Mr. Floberg. Some time later on we would like to get from you your prognosis regarding a space ship propelled by nuclear energy.

Mr. FLOBERG. I will be glad to do anything I can.

The CHAIRMAN. The time now doesn't permit.

Mr. FLOBERG. I am at the disposal of the committee.

The CHAIRMAN. If there are no further questions, the committee will adjourn until tomorrow morning at 10 o'clock.

By the way, tomorrow morning we have Brig. Gen. Alfred D. Starbird, of the AEC, and Mr. H. B. Loper, chairman of the Military Liaison Committee, important witnesses for this hearing.

We will adjourn until tomorrow morning at 10 o'clock.

(Whereupon, at 11:52 a.m., the committee adjourned to 10 a.m. March 22, 1960.)

TO AMEND THE NATIONAL AERONAUTICS AND SPACE ACT OF 1958

TUESDAY, MARCH 22, 1960

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND ASTRONAUTICS,
Washington, D.C.

The committee met at 10 a.m., Hon. Overton Brooks (chairman) presiding.

The CHAIRMAN. The committee will come to order.

This morning we have two distinguished witnesses appearing before our committee. Both of them have backgrounds of vast experience that they can draw upon and they certainly ought to be most helpful to the committee in writing the present legislation.

We'll hear Brig. Gen. Alfred D. Starbird, Director of Military Applications for the U.S. Atomic Energy Commission, and we'll also hear from Gen. Herbert B. Loper, Chairman of the Military Liaison Committee, which was established under the terms of the act which created AEC.

Which one of you gentlemen would prefer to go first?

General Loper, does it make any difference?

General LOPER. I think it makes no difference, Mr. Chairman, but I have been designated to start this off, so I would be very happy to do so.

The CHAIRMAN. I think it would be appropriate to proceed according to the designation.

You have a very interesting statement here, and if you wish to proceed with it we will be very happy to hear you.

General LOPER. Thank you, sir.

STATEMENT OF GEN. HERBERT B. LOPER, CHAIRMAN, MILITARY LIAISON COMMITTEE, ATOMIC ENERGY COMMISSION

Mr. Chairman and members of the House Committee on Science and Astronautics, I consider it a privilege to be invited to give my views as Chairman of the Military Liaison Committee to the Atomic Energy Commission, of the effectiveness of the Committee as an interchange mechanism in the accomplishment of the responsibilities of the Department of Defense and the Atomic Energy Commission. As many of you will recall, I appeared before the Select Committee on Astronautics and Space Exploration on April 28, 1958, when the national aeronautics and space bill was under consideration. Therefore, some of what I am going to say will already be a matter of record.

I plan to discuss today the mission of the Military Liaison Committee to the Atomic Energy Commission, the organization of the

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Committee and its staff, the functions for which the Military Liaison Committee is responsible, and the procedures which we have found to be effective in accomplishing our responsibilities.

The minimum organization of the Committee is prescribed by law in section 27 of the Atomic Energy Act of 1954. This section provides for a Chairman who is appointed by the President, by and with the advice and consent of the Senate. In addition, the act provides for membership consisting of a representative or representatives in equal numbers from the Army, Navy, and Air Force. The mission of the Military Liaison Committee is not directly defined in the act. Rather, the related responsibilities of the Atomic Energy Commission and the Department of Defense are defined for specific areas of activity and the Military Liaison Committee function in the communication channel is stated in the act.

It will be necessary for me to outline briefly these interagency responsibilities to clarify the manner in which the Committee assists each. For example, section 27 of the act prescribes that the Atomic Energy Commission will advise and consult with the Department of Defense through the Military Liaison Committee on all atomic energy matters which the Department of Defense considers to be related to the military applications of atomic weapons or atomic energy. This includes the development, manufacture, use, and storage of atomic weapons, the allocation of special nuclear materials for military research and the control of information relating to manufacture or utilization of atomic weapons. Furthermore, the Commission is responsible for keeping the Department of Defense informed through the Military Liaison Committee of any such matters which are before the Commission. The Department of Defense, on the other hand, is responsible for keeping the Atomic Energy Commission informed through the Military Liaison Committee on all Department of Defense matters which the Commission considers related to the development or application of atomic energy. In addition, the Department of Defense has the authority to make written recommendations through the Military Liaison Committee to the Commission, on matters relating to the military application of atomic energy.

In further amplifiation of the organization and responsibilities as covered in the act, the Secretary of Defense has prescribed—currently, Department of Defense Directive 5148.1, dated January 7, 1959—that the membership shall consist of two members from each of the departments and that the Chairman shall be provided a staff.

I would like now to say a few words about the organization of the Committee and its staff. The present composition of the Committee is seven, consisting of myself as Chairman and two officers of flag or equivalent rank from each of the three Departments. Each of the members has an alternate who is authorized to participate in the member's absence. The Chief of the Defense Atomic Support Agency and the Director of Military Application, Atomic Energy Commission, or their alternates, are present as observers at each of the meetings and participate in the discussion, but do not have voting privileges. A staff consisting of 13 military personnel, drawn in approximately equal numbers from the three services, and seven civilian clerical personnel are resident at the Atomic Energy Commission Headquarters in Germantown, Md. This staff, headed by an Executive Secretary, is organized into three divisions—an Administrative,

a Technical, and a Special Projects Division. This staff prepares actions for formal consideration by the Committee and, of equal importance, serves as a local point of contact to facilitate Atomic Energy Commission-Department of Defense relations at the staff level.

Of course, the organization and size of the Military Liaison Committee, as just outlined, has developed from more than 13 years of experience in meeting the requirements of the Atomic Energy Commission and the Department of Defense by providing an effective channel for the exchange of information and guidance, in their areas of mutual endeavor. You are undoubtedly fully aware that the Atomic Energy Commission has certain vital and important functions in which the Department of Defense has a paramount interest. The Commission is, by law, charged with the development and production of nuclear weapons and the development of certain other applications of nuclear energy for military and civilian purposes. It is charged also with the production of all special nuclear materials used in both military and civilian applications.

The Atomic Energy Act provides that the President may authorize the Department of Defense to develop, manufacture, produce, or acquire atomic weapons or utilization facilities for military purposes. Thus, the law does not specifically assign to the Atomic Energy Commission the exclusive responsibility for the development and production of nuclear weapons except for the production of all special nuclear materials used in both military and civilian applications. This is an important provision in that it enables the two agencies to apply their efforts and resources to the complete job of designing and producing weapons systems with fully compatible nuclear warheads. As normally defined, this authority is exercised to a very limited extent only. However, under the broad authority granted to the President and by specific agreement in each case, the military services do undertake the development and production of certain parts and components of weapons in cases where the services have a unique capability. Some nonnuclear parts of artillery shells and depth bombs developed by the Army and Navy, respectively, are examples of work in the nuclear weapons field performed by the military services. As regards the integration of warheads or bombs designed by the Commission and delivery systems designed by the Department of Defense, there are inevitably a number of gray areas in which a part or a component might be considered as belonging to the weapon or, alternatively, to the system. If the Atomic Energy Commission were assigned exclusive responsibility for the design and production of nuclear weapons, serious complications in the adaption of these weapons to delivery vehicles designed by the Department of Defense might occur.

These important military support functions having been assigned to the Atomic Energy Commission, it becomes essential that the very closest cooperation be maintained between the Department of Defense and the Commission to allow the Commission to meet and to insure that the Commission does meet military requirements for applications of atomic energy.

Allied to these primary functions of the Commission, there are a great many activities of joint AEC–DOD concern in the detailed day-to-day prosecution of the atomic energy business. In the weapons area, some of these subordinate functions are: The establishment of

requirements as to quantities and characteristics; the scheduling of production to meet the operational needs of the Department; the conduct of nuclear diagnostic and weapons effects tests; and the development of handling, storage, and accountability criteria and procedures to insure safe, ready storage with maximum protection against sabotage and loss.

In the field of nuclear reactors, the major areas of joint interest encompass research, development, health aspects, and criteria for safe operation of reactors to meet current and forecast military needs. Current projects involve the propulsion of ships, manned aircraft, missiles and rockets, and the provision of power for remote areas, military operations, and auxiliary requirements for space vehicles.

Supporting both the weapons and nuclear reactor areas, there are needs for continuous review of production scheduling and allocation of nuclear materials and other special materials which the Commission is in a unique position to produce and for a related review of the construction of production, test, and utilization facilities.

The Atomic Energy Act of 1954, agreements between the Commission and the Department, and the dictates of experience have also established varying measures of mutual responsibility, with the accompanying need for cooperation, in the classification, security, public information, and intelligence fields, and with respect to proposed exchanges of materials and information with allied governments.

In the relationship between the Atomic Energy Commission and the Department of Defense, one must keep in mind that the Commission performs a specific military function in designing and building weapons for the Department. In so doing, the Commission is not performing as a contractor to the Department, but as a separate Government agency. This statutory division of responsibilities alone makes the establishment of formal liaison, and of an appropriate agency to perform it, to my mind quite appropriate and desirable.

The procedures and methods used in carrying out liaison between the two agencies are based on these interrelated responsibilities and are as many and varied as the differences in the two participating organizations, themselves. As with any organization, there were flaws found in the procedures and methods of operation originally established. Questions as to relative authority arose, and have been clarified by presidential directives, agreements between the Commission and the Department, and by some changes in the law. It is my view that over the years the Military Liaison Committee has operated very effectively and quite to the satisfaction of both agencies concerned.

The liaison accomplished by the Committee is continuous. As the channel for formal correspondence between the Department of Defense and the Atomic Energy Commission, the committee transmits requirements of the Department to the Commission and keeps the Commission currently informed of present or projected Department activities in the atomic energy field. It also receives Commission requests for guidance or information and furnishes a coordinated Department of Defense reply to these queries. Although the Committee formally meets every two weeks to conduct its continuing business, many items of urgency are handled in intervening periods either by hurriedly scheduled conferences or by individual concurrences of the members. The staff of the Committee is, of course, engaged in con-

tinuous contact with appropriate offices of both the Department and the Commission, seeking information and acquiring informal coordination on joint activities and problems.

As a forum for items of unusual or outstanding joint interest, the Committee schedules monthly meetings with the Commissioners. These joint meetings are usually conducted informally and result in a closer mutual understanding of the activities, responsibilities, and problems of the two agencies. Also, to maintain a reasonable familiarity with the capabilities, facilities, and problems of the major field agencies in the military applications field, the Committee visits major installations and contractor facilities of the Commission on a timely basis.

The liaison activities so far pictured have been those of the Military Liaison Committee. Between such large agencies as the Atomic Energy Commission and the Department of Defense, with their many organizational segments and closely interrelated activities, it would be presumptuous to expect all communications to pass through such a single point of contact. The Military Liaison Committee therefore largely confines its activities to those matters entailing an establishment of policy or agreement in a major field of joint interest, initiating a new specific requirement or activity, or having a broad impact on the AEC–DOD relationship in other important areas.

Within the framework of the policy, agreements, procedures, and approved projects established for the Department through the Military Liaison Committee, direct contact and exchange of information and views between the Department and the Commission at appropriate levels are encouraged, as the most practicable method of achieving close working knowledge and relationships between the agencies in the day-to-day prosecution of these diverse and complex fields of effort. Thus, there are other agencies in the Department not directly under the Military Liaison Committee which maintain a close technical scrutiny of major aspects of the atomic energy program of the Department and which routinely conduct business with agencies of the Commission having similar responsibilities and interests.

A prime example is the Defense Atomic Support Agency, which, under the direction of the Joint Chiefs of Staff, coordinates the technical aspects of the atomic weapons program of the Department from the start of design and engineering effort on an approved weapon concept to the stockpiling of the resulting warhead or bomb. The activities of this Agency necessarily involve close working relationships with certain operating agencies of the Atomic Energy Commission and of the military services. For this purpose, certain field agencies of this organization are assigned technical responsibility for specific segments of this effort and are authorized direct and continuing access to those regional operations offices of the Commission having similar responsibilities in the design, production, test, and modification of developmental and stockpile weapons.

In areas of particular importance or complexity, the Commission and the Department, by agreement, have established various forms of joint organizations to discharge certain responsibilities of the parent agencies. These organizations are established on a permanent or ad hoc basis depending on the nature of the work to be performed. The Joint Atomic Information Exchange Group, for example, was

established to monitor and aid in controlling the exchange of atomic information with other nations under the terms of the Atomic Energy Act and of the Agreements for Cooperation with those countries.

This agency is staffed with approximately equal numbers of technical personnel from the Department and the Commission. Proceeding under jointly prescribed policy and procedures, the group accomplishes the routine screening of atomic information proposed for transmittal to foreign governments. The group normally refers action to the parent agencies only when information proposed for transmission is not clearly communicable both under the law and an appropriate Agreement for Cooperation.

In the military reactor programs of the military services, another form of liaison and joint operation is employed. Representatives of the military services are currently assigned to, and act in positions of responsibility in, the military reactor branches of the Division of Reactor Development of the Atomic Energy Commission. Three of the Assistant Directors of the Commission's Division of Reactor Development are military personnel who also head the military reactor programs in their respective services. These individuals are then in the unique position of directing the military reactor program for their respective services, and also directing the associated reactor development program for the Atomic Energy Commission.

Summary: In summary I may say that I believe the Military Liaison Committee is performing a very useful function. However, I cannot conclude from my experience that the same or similar method of liaison between the NASA and Department of Defense would be equally useful or useful at all. The situations are not the same. In fact, they appear to me to be quite different. The AEC performs specific functions of primary interest to the Department; namely, research, development, and design of nuclear weapons and military reactors, and the production of nuclear weapons. In other words, the AEC provides specific components of weapons systems for which the overall responsibility for development and utilization rests with the Department of Defense. Here, the division of responsibility is clear cut. The purpose of the committee is to assure that both agencies work in close harmony to a single end, namely, the timely availability of complete weapons systems.

As I understand Public Law 85–568 and the amendments proposed by H.R. 9675, it is not intended that the law would assign to the NASA the performance of specific functions for the Department of Defense, nor vice versa. Thus, it would not be safe to assume that liaison arrangements should be the same or similar.

The Atomic Energy Commission, in addition to the functions performed of primary interest to the Department, has very broad and important responsibilities for the development of nuclear energy for peaceful purposes. These activities of the Commission do not fall under the cognizance of the Military Liaison Committee nor does the Committee presume to interpose itself into this part of the Commission's business nor to comment on these activities unless specifically requested to do so by the Commission. In my opinion, if the Commission were engaged primarily or solely in these peaceful applications of atomic energy, no useful purpose would be served by setting

up a permanent liaison Committee between the Commission and the Department.

I believe that such cooperative effort and mutual support as might be necessary or useful in connection with these activities could be accomplished quite as readily and effectively by direct contacts at the policy, staff, and field agency levels as appropriate to the subject in hand. In the same way it seems to me that coordination and cooperation between the Department and the NASA in their respective fields can best be accomplished by:

(1) Agreement between the agency heads or their immediate and responsible deputies on matters of policy under the terms of the law and by the direction of the President.

(2) The maintenance of contact and the arrangement of details concerning joint projects or projects of mutual interest through direct contact at staff and operational levels or through joint working groups or task forces, as appropriate.

This concludes my formal statement, Mr. Chairman.

The CHAIRMAN. Thank you very much, General Loper, for a very exhaustive statement. I have a number of questions to ask you, but for the time being we will forgo questions and hear from Brig. Gen. A. D. Starbird, Director of the Military Application Division of AEC. I think it is appropriate we have the two statements together.

You also have an extensive statement, which we will be glad to hear at this point.

STATEMENT BY BRIG. GEN. ALFRED D. STARBIRD, DIRECTOR, DIVISION OF MILITARY APPLICATION, ATOMIC ENERGY COMMISSION

General STARBIRD. Mr. Chairman and members of the committee, it is a great pleasure and a privilege for me to appear before you today. From my discussion with Mr. Yeager, special consultant to the committee, I understand that you are interested in having my prepared testimony answer two questions:

(*a*) First, what is the nature and responsibility of the Division of Military Application of the Atomic Energy Commission? And second,

(*b*) What is the liaison that the AEC must accomplish with the Department of Defense and how is it accomplished?

2. To make clear my explanation as to what is the nature and responsibility of the Division of Military Application, I must first explain briefly the Commission's authorities in the field of military application. And in so doing I will repeat in part, but in a different manner, what General Loper has already stated. I shall define the working relationships into which these authorities have been converted. I shall follow this with a short explanation of the AEC's organization and finally state where the Division of Military Application sits in that organization.

3. Commission's responsibility under law for nuclear military application.

(*a*) Chapter 9 of the Atomic Energy Act of 1954, entitled "Military Application of Atomic Energy," defines the Commission's authorities

and responsibilities in the area. I believe I should repeat verbatim portions of that authority:

SEC. 91. AUTHORITY.—

a. The Commission is authorized to—

(1) conduct experiments and do research and development work in the military application of atomic energy; and

(2) engage in the production of atomic weapons, or atomic weapon parts, except that such activities shall be carried on only to the extent that the express consent and direction of the President of the United States has been obtained, which consent and direction shall be obtained at least once each year.

b. The President from time to time may direct the Commission (1) to deliver such quantities of special nuclear material or atomic weapons to the Department of Defense for such use as he deems necessary in the interest of national defense, or (2) to authorize the Department of Defense to manufacture, produce, or acquire any atomic weapon or utilization facility for military purposes: *Provided, however,* That such authorization shall not extend to the production of special nuclear material other than that incidental to the operation of such utilization facilities.

(*b*) Under a chapter of the act entitled "Definitions," there is language which explains what is meant by the key terms "atomic weapon" and "utilization facility." I shall not repeat these in full but shall point out that—

(1) the term "atomic weapon" means any device, designed for use as a weapon, exclusive of the means of transporting or propelling that device (where such means is a separable and divisible part of the device); and

(2) also, the term "utilization facility" clearly includes military reactor, power and propulsion units which use special nuclear material. By such material I mean material such as enriched uranium and plutonium.

(*c*) Separately in the act there is language specifying the Commission's authority for producing these "special nuclear materials," materials such as enriched uranium and plutonium. Here again, I shall not repeat the language in full, but only point out that the law makes the Commission solely and completely responsible for such production.

(*d*) In summary then, the act specifies that only the Commission will produce special nuclear materials. The Commission is the agency to conduct research and development on "atomic weapons" and military "utilization facilities." The Commission is to produce the "atomic weapons" except insofar as the President decides that the Department of Defense should participate. Operating nuclear "utilization facilities," with Presidential authority, can be produced by the Department of Defense.

4. Working relationships resulting from these authorities. From these clear provisions of the law, formal agreements have followed as to the division of responsibility between the Commission and the Department of Defense. These provide that—

(*a*) in the field of atomic weapons, the Commission conducts research on, develops, and produces bombs in their entirety, but not the aircraft to carry these. It has similar responsibility for the nuclear warheads carried by missiles but not the separable means of propelling—the missiles proper. Development and production of the aircraft and missiles to use atomic weapons is the responsibility of the Department of Defense Establishment;

(*b*) for power and propulsion units, the Commission con-

ducts research on and develops a prototype power or propulsion unit to the point where a working system is satisfactorily developed. Production of developed reactors or power sources, based on these original prototypes, is the responsibility of the using agency. Responsibility for missiles and/or vehicles to use these power sources, for the development and production, is the responsibility of the Department of Defense.

5. (*a*) Now to discuss the Commission's organization. The initial Atomic Energy Act of 1946 and the present act of 1954 have both called for certain positions under the Commission itself and within the AEC staff. For example, both called for a General Manager with assistants, a General Counsel, and a Director and Division of Military Application. The 1954 act and its 1946 predecessor contain no specific statement as to the responsibility to be assigned the Director and the Division of Military Application but provide that the Commission will decide that responsibility. Both acts, however, provide that the Director of the Division will be a military officer.

(*b*) I have attached a late organizational chart of the Commission and staff. However, so as to explain more easily the organizational structure into which the Division of Military Application fits, I have sketched the simplified diagram at chart 2.

And that is the last page of my statement.

I would like to refer you to this simplified chart for my further discussion of the Division and its responsibilities.

(*c*) There are in the Commission six major operating divisions. By an operating division I mean one which directs, and is responsible to the Commission for, field activities involving an important part of the Commission's research, development, and/or production. As you can see from the chart those operating divisions are as follows:

(1) The Division of Raw Materials which directs the procurement and concentrating of ore.

(2) The Division of Production which directs the operations which convert these materials into usable nuclear materials.

(3) The Division of Military Application whose primary responsibility is that of directing the research, development, production, test, and storage of nuclear weapons. The Division also carries out such other activities related to military problems as desired by the Commission and which are not specifically delegated to other members of the staff.

(4) The Division of Reactor Development which conducts research and development on both military and civilian power units. Commissioner Floberg yesterday, and General Loper today, have already explained the organizational structure within that Division and within the Department of Defense for carrying on the military reactor and propulsion work.

(5) The Division of Research directs at various laboratories and universities throughout the country the more basic research in connection with atomic energy.

(6) There is a Division of Biology and Medicine which directs and carries on research in matters of health, safety, biology, and medicine.

6. I would now like to discuss very briefly the organization and responsibilities of the Division of Military Application.

(*a*) The Division of Military Application consists of some 91 individuals of whom 25 are military officers on active duty from the 3 services, some 27 are civilian management and administration experts, and some 38 are stenographic and records personnel.

I would like to insert here a comment to the effect that the military officers, when assigned to the Commission, are completely responsible to the Commission. They are not on a liaison assignment from the Department of Defense.

Our responsibilities as officially set forth in the Federal Register are as follows:

SEC. 1.114. DIVISION OF MILITARY APPLICATIONS. The Division of Military Application directs the research, development, production, testing, and storage of atomic weapons; manages related AEC installations and communities; and assists in maintaining liaison between the Atomic Energy Commission and the Department of Defense. The Director, Division of Military Application, is authorized to make and administer contracts, and to delegate his authority, except that new and unusual types of transactions are subject to prior consideration of the General Manager.

(*b*) The Commission's operating activities are supervised by 12 "managers of operations" outside of Washington and having functional and area responsibilities; 2 of the 12 report to the Director of Military Application. Under these two managers are the various contractor organizations—largely operating in Government-owned facilities—which accomplish the Division of Military Application's share of the Commission's work. These contractor-operated activities include the three great nuclear laboratories—Los Alamos, Livermore, and Sandia. They include various large and small production organizations and plants. They include organizations at various ranges, test areas, and storage sites.

7. This then, I hope, will give an idea of the nature and responsibility of the Division of Military Application of the Commission. In summary:

(*a*) The Commission's responsibility in the weapons field is that of developing and producing nuclear bombs and warheads to go in missiles. The Division of Military Application's primary responsibility is in the weapons field. In this field, the Division of Military Application is the operating unit charged by the Commission with supervising and administering the Commission's responsibility.

(*b*) The Division does not have responsibility for certain military applications specifically assigned to other Divisions which can more appropriately supervise the work concerned. The most notable example of this is the work of nuclear propulsion and power which is the responsibility of the operating Division of Reactor Development.

8. Need for liaison: In covering the second question, that of liaison with the Department of Defense, I shall first explain the nature of the liaison needed and then describe the manner of accomplishment. From my earlier discussion I think it apparent that the AEC's responsibility is that of developing and producing clearly defined parts of the weapons systems and not for end-products complete unto themselves. The Department of Defense is responsible for producing the other parts and these, too, are clearly defined. As between the two there is no duplication of responsibility. Yet the AEC's bomb is a

part of an aircraft-comb system, the warhead is a part of a missile-warhead system, and the power or propulsion unit is a part of the ship, aircraft, or rocket. Naturally, the system is only as good as the AEC component—the bomb or warhead, the power or propulsion unit. Naturally, too, the system is only as good as the carrier into which the weapon, power, or propulsion source fits. The two together are only good if they are ready at the same time, if the fit is complete, and if the system is as simple as possible, reliable, and safe. To make sure that the two parts of the systems make this fit, particularly with the tight time-scales demanded of new nuclear military systems, requires the closest coordination, continuously, and at all levels.

9. The Military Liaison Committee: As General Loper described, both the 1946 and 1954 Atomic Energy Acts called for an independent Military Liaison Committee and defined its responsibilities. He has explained also the Committee's composition and how it operates. I do not wish to repeat what he has covered. I would like to point out the nature of the coordination effected through the MLC, the Military Liaison Committee. It is through that Committee that the AEC and Department of Defense agree, and ordinarily formally in writing, on: new systems to be investigated; systems to be developed; physical characteristics of these; criteria for safety and behavior; timing of first deliveries; and numbers thereafter. It is through the Committee that agreement is made on policy relative to security, classification, the limits of dissemination of information to allies, safety rules, and other matters essential to letting smooth work proceed.

10. In volume, this coordination through MLC is small as compared with that conducted by elements of AEC directly with organizations of the Department of Defense. Many members of the Division of Military Application and other AEC Divisions meet daily with the MLC staff, with General Loper's Pentagon office—where he serves as Assistant to the Secretary of Defense—with the various service organizations having an interest in atomic energy matters, with parts of the JCS, and particularly with the Defense Atomic Support Agency, whose function General Loper has explained also.

In the field, our Operations Offices coordinate with various military field organizations and their contractors. Our laboratories and developmental organizations work intimately with the contractors developing the system and with the commands which will use the system. However, such coordination is within the framework of decisions agreed formally through the MLC, or in development of matters later to be so formalized.

11. I have been with the Commission somewhat over 4 years in the capacity of Director of Military Application. During this period I have worked intimately with the MLC. It is my feeling that, for the type of coordination necessary between the Commission and the Department of Defense; that is, coordination to insure that two separate agencies producing components of a single system, the Military Liaison Committee has been a great asset. It provides a single point of focus to which we in the AEC can go for information on policy

and on new and different nonpolicy matters. It is a focal point where all services' views are brought to bear and from which advice is known to be coordinated as between any differing service interests. It is a group of highly experienced military personnel who are familiar in detail with the AEC's operations and hence can forecast what benefit new developments can be to defense. These same individuals are highly placed in the Departments of the Defense Establishment. From such positions they can speak authoritatively on their Department's needs and capabilities.

(The charts referred to are as follows:)

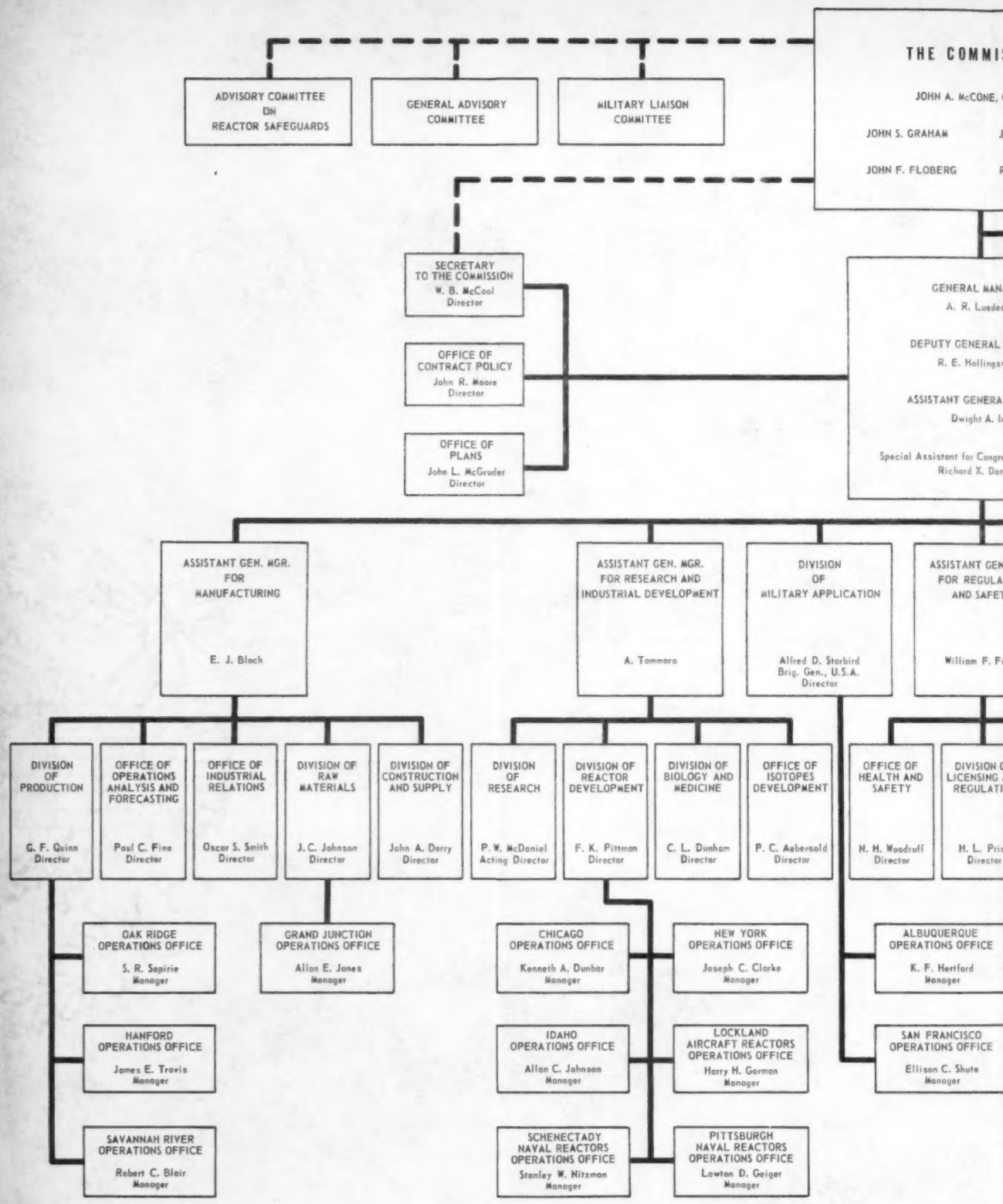
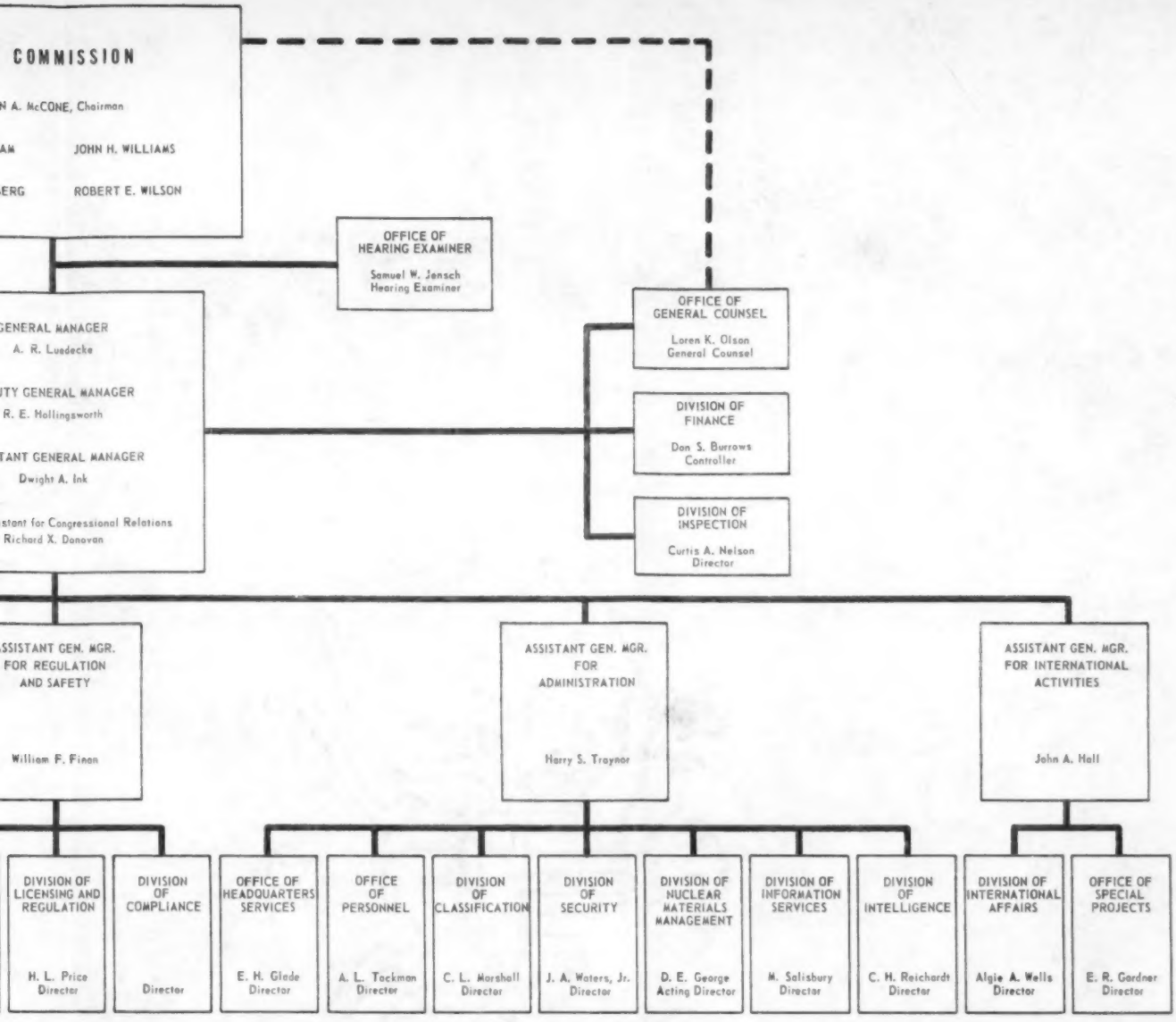


CHART 1

53283 O - 60 (Face p. 296)



UNITED STATES
ATOMIC ENERGY COMMISSION

ORGANIZATION CHART

MARCH 22, 1960

Approved: A. R. LUEDECKE
General Manager

CHART 1

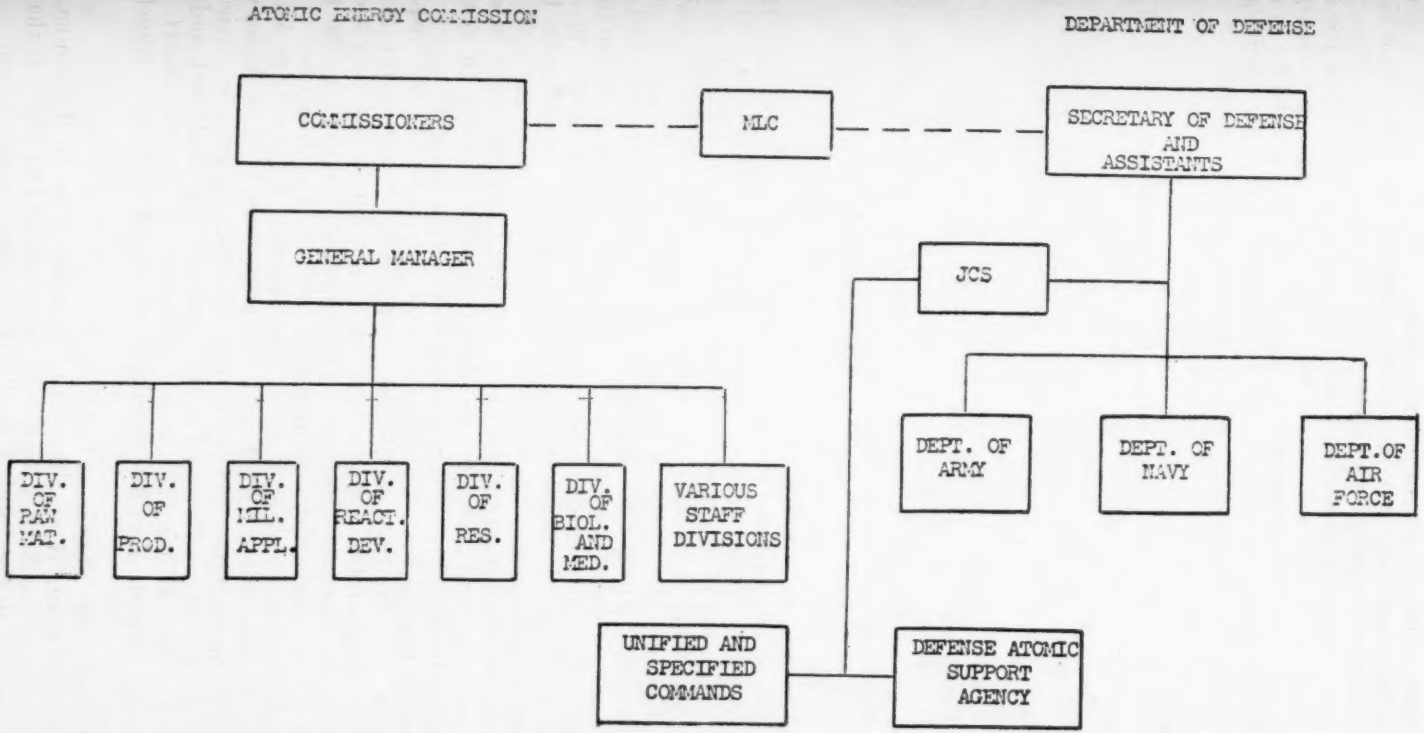

ATOMIC ENERGY COMMISSION
DEPARTMENT OF DEFENSE
COMMISSIONERS
MLC
SECRETARY OF DEFENSE AND ASSISTANTS
GENERAL MANAGER
JCS
DIV. OF RAW MAT.
DIV. OF PROD.
DIV. OF MIL. APPL.
DIV. OF REACT. DEV.
DIV. OF RES.
DIV. OF BIOL. AND MED.
VARIOUS STAFF DIVISIONS
DEPT. OF ARMY
DEPT. OF NAVY
DEPT. OF AIR FORCE
UNIFIED AND SPECIFIED COMMANDS
DEFENSE ATOMIC SUPPORT AGENCY

CHART 2

That is the end of my formal statement, sir.

The CHAIRMAN. A very excellent statement, too, General. The committee appreciates it very much.

Now, the two statements together, I think, open up lines of inquiry that I had not previously thought of. I am sure they affect the other members of the committee in the same way. We would like to ask you some questions, if we may, in reference to your statements and in reference to matters that might not appear in your statements.

In the first place, it seems to me that from the statements, taken together——

Mr. FULTON. May I make a suggestion on procedure today? That we start with the other end of the committee——

The CHAIRMAN. We did that yesterday. Now, if the gentleman wants to do it every day, it is perfectly all right with me. I should think that we would do it now and then. Whatever the committee wants.

Mr. FULTON. After you are through I will yield for that purpose.

The CHAIRMAN. Do I hear any further discussion on that idea?

Mr. HECHLER. I would like to thank you.

The CHAIRMAN. The Chair will recognize Mr. Moeller at this time.

Mr. MOELLER. I have no questions, sir.

The CHAIRMAN. The Chair recognizes Mr. Daddario.

Mr. DADDARIO. I pass.

The CHAIRMAN. Mr. Hechler?

Mr. HECHLER. I think both of these statements are excellent. General Loper, my impression of your statement is that you said the Military Liaison Committee is a wonderful thing, but perhaps we had better not apply it to the other area. This is a little disillusioning. Do you think the answer to the interdepartmental liaison for space activities is to abolish all formal liaison requirements and to leave individual administrators to conduct informal liaison, or do you think that we ought to have a more formal arrangement that will centralize and specify authority and direction and control over U.S. military and space activities?

I presented two alternatives here. Do you think we ought to leave it entirely informal, or do you think we ought to try to achieve greater authority, direction, and control by formalizing it?

General LOPER. No. I think that the arrangements for cooperation and coordination should be formalized by agreement at the policymaking level of the two agencies. In other words, they should establish arrangements, formal arrangements, for insuring that they do set up the mechanisms to maintain constant coordination.

Mr. HECHLER. Precisely how is coordination between the Atomic Energy Commission, NASA and the Department of Defense, with respect to nuclear-powered launching vehicles, going to be carried on (a) if the Civilian-Military Liaison Committee is abolished, and (b) if the Civilian-Military Liaison Committee is not abolished?

General LOPER. You are speaking of nuclear-powered launching vehicles?

Mr. HECHLER. That is correct.

General LOPER. Well, this would appear to me to determine first which agency, the NASA, or the Department of Defense, has the primary interest in the specific application under consideration.

Mr. HECHLER. All right. Now let me direct your attention to the bill that we are considering here, H.R. 9675, page 9, section 309(b), which states "Responsibility for the development of each new launch vehicle shall be assigned by the President to either the Administration"—that is NASA—"or the Department of Defense."

Now, under that language, how will such an arrangement affect the Atomic Energy Commission? Will it mean that either NASA or the Department of Defense could place a requirement on AEC for any part of a launch vehicle that needs nuclear parts?

General LOPER. I would assume this would be the followup of the assignment of the responsibility for the development of the launch vehicle. The agency having that responsibility as directed by the President would make its arrangements then directly with the Atomic Energy Commission for the assistance that it required.

Mr. HECHLER. I have to ask these quickly, since I only have 5 minutes. Do you think that the wording of this provision, 309(b), indicates that such a decision will be made before any new launch vehicle is undertaken? I think this is a crucial question, because it involves, of course, the possibility of saving or wasting a good deal of money.

General LOPER. I would think that would be the procedure, yes.

Mr. HECHLER. I would certainly hope so.

Now, could you give me any examples of a nuclear-powered launch vehicle that would be used only by NASA?

General LOPER. I believe at the present time the nuclear propelled rocket, that is, the Rover program, is assigned specifically to NASA, whereas the nuclear-propelled Ramjet is indicated to be a forthcoming weapons system and is assigned to the Department of Defense.

Mr. HECHLER. Getting back to your answer to a previous question, I would think that there ought to be some specific means to insure that a decision on such a vital matter, which is really one of the keys to our future progress, be made in a precise way, and sufficiently in advance of such development that it could be tied down. Wouldn't it be necessary to have some type of an official, perhaps serving under the President, who could lend the sense of urgency and also to make such a decision sufficiently far in advance in this highly important field so that we move forward as fast as possible?

To me, this is one of the most exciting areas where we have potentialities for a great breakthrough.

General STARBIRD. I might sketch, sir, what actually happens to avoid duplication between the AEC and the Department of Defense in something like the weapons field.

Mr. HECHLER. Before you start, I wanted to try to direct the answer toward how to resolve this conflict with NASA, also, if you will bear that in mind in answering.

General STARBIRD. Right. I point out that there can always be duplication and waste unless the parties from the very period of concept meet staffwise and talk about who is going to do what, who is going to make a fuse, who is going to make a piece of hardware.

So the arrangements that have grown up between ourselves and the Department of Defense in this older line activity is that we start from the very time of concept of a system and sketch out who is going to do what and the timing of the division. This is not done through a formal arrangement clear up at the MLC level. It is finally for-

malized at some stage, but each of us have our work cut out and a certain limited capability, and we are anxious that we not duplicate.

The CHAIRMAN. The gentleman's time has expired.

Mr. Riehlman.

Mr. RIEHLMAN. General Loper and General Starbird, I commend both of you for the excellent statements you have made. You have explained the manner in which the Commission operates through the Military Liaison Committee with the Department of Defense. However, we are primarily interested in how your activities are going to be carried on with NASA. Following some of the questions of my colleague, Mr. Hechler, you are very frank to say at the conclusion of your statement, General Loper, that you don't feel that there is a need for a committee to carry on liaison between NASA and the Commission. Am I correct in that?

General LOPER. Yes, sir.

Mr. RIEHLMAN. The NASA has two projects, as I understand it, one is Rover and the other is the SNAP project, in which the Atomic Energy Commission is vitally interested. Now, you feel that liaison between the Commission and NASA can be worked out informally?

General LOPER. I spoke only of the relationship between the Department of Defense, which I represent, and NASA. Now, the relationship between the Atomic Energy Commission and NASA might be different. As an example, if the Atomic Energy Commission is to develop and produce a specific product for NASA, as a part of a system which NASA is developing for the exploration of space, you have a situation quite parallel to our relationships with the Atomic Energy Commission, and therefore I am not judging whether a military or a nonmilitary—not a military liaison but a liaison committee between these two agencies is good or bad. I am speaking only for the relationships between the Department of Defense and NASA.

General STARBIRD. I think I can answer, sir, that though these are not two projects that are my responsibility, I am certain it is the feeling of the Commission that through direct top-level liaison a satisfactory arrangement can be worked out.

Mr. RIEHLMAN. But there is no need for a liaison committee to be set up?

General STARBIRD. That is right, sir. But by a committee, sir, I am talking about a formal declaration of law, of a committee. I am rather certain in my own mind that working committees will be set up by the parties concerned.

Mr. RIEHLMAN. It has been stated to the committee that there would be working committees; but we are always interested in what authority these committees would have and how effective they might be. But you feel satisfied, General Starbird, that informal arrangements would be satisfactory?

General STARBIRD. I feel sure that a satisfactory arrangement can be made, and will be made, sir.

Mr. RIEHLMAN. Then, General Loper, to get back to your position with the Military Liaison Committee. I think your explanation has been that you can function effectively without an additional committee being set up for liaison purposes between NASA and AEC?

General LOPER. I believe so, as between the Department and NASA, in view of the relationships and the responsibilities to the extent that

they are defined by the act and the authority of the President to assign projects to one or the other, presumably depending upon their primary purpose, the purpose of the particular project.

Mr. RIEHLMAN. Well, do you feel that if there is a question of authority between NASA and the Department of Defense, that one or the other of those two agencies should have the final decision as to who shall carry on a given project, or should that decision rest with the President?

General LOPER. That should rest with the President.

Mr. RIEHLMAN. And not with either one of the agency heads?

General LOPER. Yes.

Mr. RIEHLMAN. That is all I have, Mr. Chairman.

The CHAIRMAN. Mr. Wolf?

Mr. WOLF. General Loper, it is academic, but why did you give your title as "the Honorable Herbert Loper," instead of General Loper? I am curious.

General LOPER. I am a presidential appointee with the advice and consent of the Senate, and Assistant Secretary of Defense. I think this is an honorary title that goes with it. I didn't ask for it. I normally am called General.

Mr. WOLF. I wondered if there were some particular reason. In other words, your appointment is a presidential rather than a military appointment?

General LOPER. Presidential.

Mr. WOLF. May I say to you, gentlemen, that I think you have made the best statements possible for the continuation of the program that we are considering amending with H.R. 9675. Frankly, I can't see any differences. I suppose there are some that I have missed. I have read your statements carefully, and I can't see any area where there would be a conflict, or where you have proven that the change should be made regarding NASA and the military. I wish that you might show me where there is a difference. The same engines that will power the missiles, power the vehicles into space. The same engines that will eventually launch our space platform are going to have a military and a peaceful purpose. Frankly, I think you have made two fine statements for the continuation of present arrangements, rather than for a change.

If you would like to develop this——

General LOPER. No, sir. I thought that I had—at least I feel that there is quite a difference in the relationships in this specific matter, and that is the Atomic Energy Commission produces a product which fits into a military system. The customer is the Department of Defense, and the customer has established a liaison committee which reports only to the Secretary of Defense. It does not report to the Commission. It simply acts for the Secretary of Defense in seeing that the product which the Commission makes meets the military requirements, providing for the Commission all the information it needs from the military side so that it can do its part of the job.

So it is quite a different thing than from two agencies operating in the same medium, where neither one is doing a specific job for the other, but where the things which they make do, and will do, will be of mutual interest and benefit.

53283—60——20

This does require a coordination, but it does require, in my opinion, initially, a division of these responsibilities; and secondly, the maintenance of top-level decisionmaking liaison, since the specific division is not defined by law, here we have a case in the Military Liaison Committee in the AEC where the division of responsibility is set up by the law, one with essentially exclusive responsibilities, although not specifically so defined.

The utilization of the Department of Defense and the services in the production, design, development, and production of nuclear weapons is very, very limited, as I have pointed out. It only deals with certain minor interface problems. But the Military Liaison Committee is designed to perform a real, specific function, not a general coordinating of all activities of the AEC.

As I pointed out, the AEC has great civilian responsibilities. These are not matters for coordination with the Department of Defense. The Military Liaison Committee does not exercise any cognizance of these civilian activities of the NASA, but only with respect to the particular and specified functions of the AEC which are of immediate and primary interest to the Department of Defense.

Mr. WOLF. Then would it logically follow that there should be only one agency developing space engines of any kind?

General LOPER. No; it does not necessarily follow. If it did follow, then if you had one agency developing and producing space engines as its exclusive responsibility, then the other customer would need a liaison committee such as we have to represent its interests.

Mr. HECHLER. Will the gentleman yield for a brief question?

Mr. WOLF. Certainly.

Mr. HECHLER. If it is true that the Department of Defense doesn't have a present military requirement for placing as heavy payloads in outer space as NASA does, doesn't this mean that NASA is really going to be the agency that will get the assignment for using the nuclear-powered launch vehicles?

General STARBIRD. I think that is the current belief, sir, and that is the reason that our joint effort right now is with NASA, rather than directly with the Department of Defense. You see, the Rover project, as you remember, was a liaison project, was a project carried out initially jointly with the Department of Defense, which was moved to NASA.

The CHAIRMAN. The gentleman's time has expired.

Mr. Bass?

Mr. BASS. General Starbird and General Loper, I would like to ask both of you this question: I know it has been touched on before, but you both feel that the provisions of H.R. 9675 would set up a basis for the best possible working relationship and liaison between AEC and NASA in working out problems of mutual interest?

Perhaps I might ask General Loper first.

General LOPER. Again, I don't represent the AEC, and I would defer that to General Starbird. I recognize that he has already indicated that this arrangement is satisfactory.

General STARBIRD. I think Mr. Floberg yesterday testified to the effect that agreements had been reached with NASA to the effect that nuclear propulsion would be an activity carried on by the AEC, that there was no question of this act making any change in the Atomic

Energy Act with regard to responsibilities in this field. But he did suggest that in connection with the report on the act, that there might be a comment clarifying the fact that this field of activity should remain with the experts in the field, the AEC.

Mr. BASS. And that reflects your views, too, General?

General STARBIRD. I am a little at—on weak ground here, sir, because this is not a project of which I am the responsible agent. I can only, therefore, report to you what is the opinion of the Commissioner who testified on it, sir.

Mr. BASS. Well, we have before us H.R. 9675, and if possible, I would like to get your direct comment on whether you think this bill provides the best solution insofar as the working relationship between NASA and AEC is concerned.

General STARBIRD. I think I would have to answer you this way, sir: I would have to get something for insertion in the record from the Commission on this. It is my feeling from what Mr. Floberg said yesterday that it is the belief of the Commission that it is entirely satisfactory, sir.

Mr. BASS. Well, in order to clear up any doubt about this, I would like to request that you make such an effort.

General STARBIRD. Right, sir.

Mr. BASS. That is all.

(The information requested is as follows:)

U.S. ATOMIC ENERGY COMMISSION,
Washington, D.C., March 30, 1960.

Hon. OVERTON BROOKS,
Chairman, Committee on Science and Astronautics,
House of Representatives.

DEAR MR. BROOKS: On March 22, 1960, during testimony before your Committee on Science and Astronautics, Brig. Gen. Alfred D. Starbird was asked the following question by Mr. Bass:

"Well, we have before us the consideration of this bill, H.R. 9675, and if possible, I would like to get your direct comment on whether you think that bill provides the best solution insofar as the working relationship between NASA and AEC is concerned."

In response, General Starbird stated it was his "feeling from what Mr. Floberg said yesterday that it is the belief of the Commission that it is entirely satisfactory," but he would get something for the record from the Commission on this.

The bill as it is now written is satisfactory to the Commission. However, as Mr. Floberg stated in his testimony on March 21, "The bill does not expressly recognize or provide for * * * joint development efforts by NASA and AEC * * *. Because the bill is not specific on this point, it is conceivable that questions could arise between the Commission, in performing nuclear research and development for space applications, and NASA, in carrying out its space activities under the proposed law." As Mr. Floberg stated, we believe it unnecessary to amend the bill to provide that it will not affect the authority of the Commission, under the Atomic Energy Act, to carry out its program of research and development of nuclear propulsion systems and power sources for space application. A statement to this effect in the committee report would, we believe, be satisfactory.

I hope that this answer meets the committee's needs; if not, we will be pleased to discuss the matter with your further.

Sincerely yours,

DWIGHT A. INK, *Assistant General Manager.*

The CHAIRMAN. Any further questions?

Mr. BASS. That is all.

The CHAIRMAN. Mr. Anfuso?

Mr. ANFUSO. General Loper, on page 12 of your statement, you speak about the activities of the Atomic Energy Commission and the peaceful uses of nuclear energy. Do you have any liaison with the military in respect to the peaceful uses of nuclear energy, or are you just confined to the military?

General LOPER. We are not strictly confined to the military, either, by law or by practice. We maintain an active interest in what the Commission does in the civilian field. Normally, because they send us letters telling us what they are doing, or through the many period calls or programs with which we are familiar. But we actually exercise no control or give no guidance or direction to these kinds of programs.

Mr. ANFUSO. General, of course you understand that this committee is concerned with the exploration of outer space, and therefore we are concerned with peaceful as well as military matters; after all, what can be used for peaceful purposes can likewise be used for military purposes. You agree to that, don't you, sir?

General LOPER. Yes, sir, within—broadly speaking, that is so.

Mr. ANFUSO. Yes. Now, we are considering amendments to the NASA Act, H.R. 9675. We are considering the matter of coordination between the Defense Department and NASA, and we are considering spelling it out in a specific section. We believe that there should be no conflict between these two agencies, but there should be a proper division of authority. We are considering establishing a Committee, and having on this Committee representatives of NASA as well as representatives of the Defense Department, and we were talking only last week here of having a representative from the Atomic Energy Commission on this Committee as well. Now, if we set up a Committee, would you have any objection to having the Atomic Energy Commission sit in on it?

General LOPER. Well, no, I wouldn't have any objection. I don't believe three-way committees established by law are going to be extremely effective, in that I can't conceive that the committees can decide on policy matters on a day-to-day basis, no.

Mr. ANFUSO. Our purpose, General, would not be to make that kind of decision, because I think the act would specify their respective duties, and any conflict would be decided by the President. We are all in accord. But as I said, our committee is interested in what is going on in the military to see whether any of their developments can be used for peaceful purposes, and likewise, we are interested in what is going on in the AEC for the same reason. Likewise, I think you should be interested in what is going on in NASA for the same purpose. So there would be no conflict in that respect.

It is a matter of exchange of information, but have the proper liaison specified by a special act.

I have no further questions, Mr. Chairman.

The CHAIRMAN. Mr. Van Pelt?

Mr. VAN PELT. No questions.

The CHAIRMAN. Mr. Fulton?

Mr. FULTON. I want to compliment you on your excellent statements.

I have no questions.

The CHAIRMAN. I have a few questions, gentlemen, I would like to ask you while you are here. I think your statements are excellent,

as I said before. I want to ask this: Your committee, according to this, simply has liaison over back-up-type work for the military; is that correct?

General LOPER. Yes, sir.

The CHAIRMAN. In other words, the peacetime use of atomic energy is not a subject matter of jurisdiction of the liaison committee?

General LOPER. That is correct.

The CHAIRMAN. So that if a liaison committee was retained for NASA, if it were to pattern itself after yours, it would have to leave out all but military types of operations; is that substantially right?

General LOPER. To parallel ours; yes.

The CHAIRMAN. To be patterned after yours?

General LOPER. Yes.

The CHAIRMAN. Now, do you feel that such a liaison committee would have a reasonable chance of success? In spite of the sharp lines you draw, I can see no difference between the objectives or the missions of NASA and those of AEC, insofar as they may be classified as military or peaceful. I will amplify my question by saying: Here is atomic energy; it has peacetime uses as well as military uses; here is space, and the same thing applies. Now, your committee has jurisdiction over liaison with AEC with regard to military applications, and if you had such a liaison committee with NASA what would be the difference, and how would you draw a distinction then between them?

General LOPER. Well, if it had only military functions I would have a serious question as to whom it should report.

The CHAIRMAN. What is that?

General LOPER. To whom it should report. In other words, if it were only discussing or only competent to deal with or discuss or conduct liaison on military applications in space, who should be its boss? I don't think it can have two bosses and perform a function satisfactorily.

The CHAIRMAN. To whom does the Liaison Committee for AEC report?

General LOPER. It reports to the Secretary of Defense, only to the Secretary of Defense.

The CHAIRMAN. Only, rather than to both?

General LOPER. That is right. And this, as I say, is because the Atomic Energy Commission is performing a function for the Secretary or for the Department of Defense.

Now, if we put it the other way, if NASA were assigned a specific function to perform for the Department of Defense, and the Department of Defense as a customer to parallel the arrangement which we have with the AEC, might well have a liaison committee to look out for the interests of the Secretary of Defense in the performance of that function.

The CHAIRMAN. Your idea, then, would be to establish a liaison committee to serve a customer of NASA, which would be the Defense Department?

General LOPER. If NASA were performing a military function, yes, sir.

The CHAIRMAN. Of course, NASA is performing a military function in some respects; it is inescapable. In that event would you take

from the military those research programs that would parallel those in AEC?

General LOPER. If that were the intent of the act, Mr. Chairman—but I don't read this to be the intent of the act. The act, as I read it, provides in section 309——

The CHAIRMAN. Which act are you talking about?

General LOPER. I am talking about both the present act and the amendment.

The CHAIRMAN. Do you mean the NASA Act or the AEC Act?

Mr. FULTON. You mean the bill, I believe.

General LOPER. I am talking of the bill and the proposed amendment, NASA.

The CHAIRMAN. NASA?

General LOPER. Yes. As I read section 309 (a) and (b), it is assumed that, by and large, I would assume, rather, that by and large the primary military functions would be performed by the Department of Defense, and those things relating primarily to civilian functions would be with NASA.

Now, if this were not to be the case, if the military function were to be performed by the NASA primarily, let's say, then the Secretary of Defense should have an agency such as—or might well use an agency such as the MLC to serve as an appropriate liaison.

The CHAIRMAN. So you put it on the basis that the objectives of the NASA Act are a little different from the objectives of the AEC Act. I helped draft the AEC Act. I was on another committee at that time.

But let me ask you about the Military Applications Division of the AEC; how does that function?

General LOPER. It is strictly an organization of the Commission. But the law provided that the Director should be an officer of the military service on active duty. The act provided this, I would assume, because the Congress felt it was wise to ensure that the director of this division had a broad military experience, but he does not in any way, as General Starbird pointed out, serve the military directly. He is a servant of, employee and servant, of the Atomic Energy Commission, just the same as anyone that they have hired from elsewhere.

The CHAIRMAN. I would say this: The influence of World War II is directly shown in the drafting of the AEC Act. I think there is no escape from that. And the influence of the military in developing nuclear energy was shown, too.

I want to ask you in reference to the Military Applications Division which has worked all right with the AEC; do you see any reason why it shouldn't work with NASA?

General LOPER. Well——

General STARBIRD. I have one comment on that, sir. It works well in the AEC because all facilities and assets of the Commission working on a particular task are assigned to that division. We are an operator, and we are an operator who is solely charged with filling needs of the Department of Defense.

The CHAIRMAN. Excuse me, but let me interrupt there. That is only in reference to those projects which are supplementary to the Department of Defense. But, now, the broad AEC program is a peacetime program?

General STARBIRD. That is right, sir, and it is carried on by other divisions of the AEC.

The CHAIRMAN. So your idea is that if a Military Applications Division were set up in NASA, it should be limited to the same type of jurisdiction?

General STARBIRD. That is right, sir.

The CHAIRMAN. That it has in the AEC?

General STARBIRD. Also that it has to have the assets and can work those assets itself. I don't think the Military Applications Division, if it were in the AEC and were only a liaison office, would be quite as effective as it is now.

The CHAIRMAN. I didn't hear that.

General STARBIRD. I don't think a military applications division, if it were in the AEC and did not control, supervise, and operate for the Commission facilities working for the Department of Defense, would be anywhere near as effective. I am not trying to comment on whether one could be set up in NASA, sir. I don't know enough about the internal workings of NASA, but just to say that the name "Military Application Division," if set up in NASA, would make for a better relationship, I think it might not, unless one realizes that the effectiveness in the AEC is because it controls operations for the AEC.

The CHAIRMAN. Controls operations only to the extent that they are supplementary to military?

General STARBIRD. That is exactly right.

The CHAIRMAN. Now, if the same thing were the case with such a division in NASA, would you reach the same conclusion?

General STARBIRD. Without knowing the internal workings of the setting up of it, sir, I think it is a good thing.

The CHAIRMAN. I have taken more than my time here because some of the members didn't use their time.

Mr. McDonough has come in, since.

Mr. McDonough?

Mr. MCDONOUGH. I have no questions.

The CHAIRMAN. I have no other questions.

General STARBIRD. I had one other comment I would like to make. I have testified that the MLC is a valuable thing for the Department of Defense–AEC relationship. Again, without trying to talk on NASA–DOD relationship, but trying to visualize what might happen with a different organization in AEC and Department of Defense, I will sketch a premise: Let us say that both the AEC and the Department of Defense were making reactors and that, therefore, a committee which was set up which had representatives from both the Department of Defense and the AEC on it, rather than one that is purely a Department of Defense organization, as is now set up—I believe in this case most of the majority policy decisions could not be made in that committee, but would have to be made by the heads of the agency.

Do I make that point to you, sir?

The CHAIRMAN. No. Well, on page 9, under paragraph 9 of your statement, I think you cover that point; isn't that right? Because you say there that it is through the committee that the AEC and Department of Defense agree, and ordinarily formally in writing, on: new systems to be investigated, systems to be developed, physical charac-

teristics of these, criteria for safety and behavior, timing of first deliveries, and numbers thereafter.

That is what you mean, isn't it?

General STARBIRD. This works well, sir, where we are producing a part and they are producing a part, and it isn't a case of both agencies, possibly, producing a similar or same part. My only point in making the added comment was that I think if you get into places where there are similar parts being made toward a system, then a military liaison committee or a liaison committee cannot make the final determination as to division of responsibility.

The CHAIRMAN. I can see that. But it would seem to me that just drawing an overall conclusion from what has been said before, and your testimony, too, is this: If your agency is designed to simply back up the military and you let military officers come over into the Agency, it works very well. But there you have got a proposition of simply playing backstop to the military and doing it with military supervision, and it works all right in AEC. But you don't allow the military to get over into the peacetime program of AEC, very definitely, and you would not conclude from that that your liaison committee would work well with AEC if it did cover peacetime purposes of AEC, is that right?

General STARBIRD. That is generally right, sir.

The CHAIRMAN. Am I substantially correct in my statement?

General STARBIRD. Yes, sir.

The CHAIRMAN. Any further questions?

Do you have any further questions—Mr. Hechler always has a question. [Laughter.]

Mr. HECHLER. General Starbird, I am quite fascinated by page 15, the chart, because this is probably the first time, I guess, since the passage of the National Security Act of 1947 that we have achieved genuine and complete unification. I am glad to see it set forth there.

I do want to ask one rather philosophical question.

I get a little frustrated sitting here, day after day, trying to establish what are the best forms of coordination and liaison and cooperation, all of which I think are absolutely necessary. Yet, wouldn't these problems fall into place if we could secure both the power of decision and leadership?

General STARBIRD. I am certain that it is true, that if you can reach a rapid decision and if the organization can follow that decision because of leadership, much, if not all, of the waste effort that individuals go through in organizations could be eliminated.

Mr. HECHLER. Now, many people talk about the disadvantages of democracy in contrast to dictatorship because of the power to force a decision at the top in a dictatorship. Yet it seems to me that the greatest energizing force which the free world has is the Presidency of the United States. I mean not only the President as an individual, but the presidential office. That is why I am trying to figure if there isn't some way in which an individual could be placed in the President's office that would help to supply the necessary direction, authority and urgency, and arrive more quickly at the necessary decisions that would serve, then, to minimize some of these problems that we have been discussing about coordination, consultation, liaison, and so forth.

General STARBIRD. I can only speak from a personal point of view, but it is my feeling that when you place a representative in the office of the White House, or someplace else, to oversee an activity of an agency, then you are robbing the director of that agency or the commissioner of that agency from some of its ability to accept responsibility and carry it out.

From my own personal view, sir, I have never seen a time when a problem that was important couldn't be taken to the President. He is normally available to handle the problem. I think it is true that many, many problems have to go to him, and it is the best thing we can do to try to figure ways of keeping unessential ones away from him.

Mr. HECHLER. Thank you, General Starbird.

The CHAIRMAN. Any further questions?

(No response.)

The CHAIRMAN. If not, we want to thank you gentlemen very much for your very fine statements, and for the help you have given this committee.

Now, one more announcement before we adjourn. There is a possibility that tomorrow we won't have our witness, Admiral Rickover, who is scheduled to appear with us. Some difficulty has developed, and he is willing and able to appear later on. In the event he is not able to be here tomorrow, then the committee would like to schedule the report of the Mitchell Subcommittee and ask the staff member, Mr. Yeager—we always call on him when we get tough assignments—to fully explain the Mitchell report to the committee, and perhaps at that time the committee might wish to voice itself on whether they approve the report, or at least it will be open for discussion.

Now, it has been on the desk of the members—I checked up—for a week. So I caution every member to go over that report. It is a very fine report, I think. While we haven't yet adopted it—I am not trying to prejudge the committee on the matter—it is really worthy of the consideration of the members of the committee and their careful study.

Mr. FULTON. Do you yield to me?

The CHAIRMAN. I yield.

Mr. FULTON. This is off the record.

(Discussion off the record.)

The CHAIRMAN. We are happy to have had you two gentlemen. Thank you very much.

We will adjourn until tomorrow morning at 10 o'clock.

(Whereupon, at 11:35 a.m., the committee adjourned, to reconvene Thursday, March 24, 1960, at 10 a.m.)

TO AMEND THE NATIONAL AERONAUTICS AND SPACE ACT OF 1958

THURSDAY, MARCH 24, 1960

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND ASTRONAUTICS,
Washington, D.C.

The committee met at 10 a.m., Hon. Overton Brooks (chairman) presiding.

The CHAIRMAN. The committee will come to order.

This morning we have a very distinguished witness, Dr. Simon Ramo. Dr. Ramo is the executive vice president of Thompson Ramo Wooldridge, Inc., and formerly president of its subsidiary, the Space Technology Laboratories. These laboratories have provided the overall scientific direction for Thor, Atlas, Titan, and Minuteman programs, and have been responsible for Pioneer 5 and other successful probes.

Off the record.

(Discussion off the record.)

The CHAIRMAN. We are happy to have you here this morning, Doctor.

Now, we would like to hear your statement. We will then ask you some questions. Subsequently, we will have to adjourn to go into executive session to take up the report on the Patent Subcommittee recommendations before the full committee.

STATEMENT OF DR. SIMON RAMO, VICE PRESIDENT, THOMPSON RAMO WOOLDRIDGE CORP.

Dr. RAMO. It is my understanding that you would like my opinion on what constitutes the most important limitations and bottlenecks to our future progress in ballistic missiles and space. It is a privilege to be invited to give my views before this important committee, and I am most anxious to do so because of some strong convictions I have built up in the last few years on this very issue.

There are two general kinds of limitations to our rate of progress in missiles and space. One of these is only a potential bottleneck, although it has received most of the national attention. This first category might be called the limitation of our physical and technical resources. It includes our scientific know-how. It covers the matter of the number of scientists and engineers that we possess as a nation compared with any serious competitor. It also involves our production capacity and all of our other physical resources.

Gentlemen, this whole category, I submit, is only a candidate for a future bottleneck. Important as a shortage in these resources will

become in the future, today our scientific and physical resources do not constitute limiting factors. Other factors outside the realm of science account for the real constriction in the bottle's neck. We are held back by our slow pace in choosing goals and making decisions, and in organizing and arranging to get things done.

Let me be specific in contrasting these two potential limitations. Several years ago, it was suddenly recognized that we were well behind the Soviet Union in long-range ballistic missiles. This recognition was followed by a temporary period of unusually bold, courageous and imaginative decisionmaking and organizing. The crash program set up has been so highly successful, as you gentlemen know, that it has provided this Nation in only 5 years with every technical advance and physical resource needed for an intercontinental ballistic missile capability. The facilities, from the detailed tooling up of industry to the creating of complex testing ranges several thousands miles out—the 10 to 1 technical art advances in propulsion, guidance, reentry, in speeds and heat rates, and in structures—all were completed on what was considered by earlier experience to be an impossible schedule.

Furthermore, the risk was taken that with such an enormous concentration of top scientific talent applied to every technical issue of the program, it would be entirely successful. Thus, without waiting for the tests to so confirm, production facilities were started, operational concepts for the military were decided upon, and bases were begun for operational use of the missiles. Not only was an intercontinental capability brought into existence, but the next generation of improved ICBM's was given a solid beginning, and other missile programs were based on the new technical knowledge and the newly available hardware. A complete intermediate-range missile capability also came out of this national effort. A final important bonus, especially interesting to this committee, I believe, was in boosters for space, along with numerous other techniques and apparatus to aid space research.

Now, perhaps this was, as some have called it, "a miracle of accomplishment." If so, it was not so much, in my opinion as a technical man, a technical miracle. The miracle, the rare thing, was that the United States, in peacetime, achieved a remarkable organizational and decisionmaking breakthrough. By pooling the technical resources available in Government, industry, and the universities, we were able to arrive at the know-how in time to meet the emergency. We were able to tool up industry and build facilities in a record time. But, gentlemen, we have not exploited that position to the fullest because, in recent years, we have become bogged down again with the real bottleneck—not the limited technical and physical resources available in this Nation, but instead, the slow process of decisionmaking, organization, and arrangementmaking.

Today, years after complete demonstrations of our technical capability, and years after the unprecedented simultaneous implementation of all of the production tools and facilities and operational military planning for the full utilization of these technical accomplishments, we still seem to be involved in major debates as to how many should be the numbers of missiles that we provide to insure inevitable retaliation—this, even though a substantial part of America's capacity

for—it says "competitive hardware," a typographical error—it should be "repetitive"—repetitive hardware stands unused. (It is true that we also have in the Nation a considerable surplus of "competitive hardware," but that is not so pertinent here.)

Our first lunar probes were delivered to the stands for launching at Cape Canaveral in less time after the decision than it took to decide whether to implement such a program and, if so, what agency should be in charge. The whole Atlas missile was put into orbit in less time, after the decision was made, than it took to make the decision.

Our sensational Pioneer V—I hope you gentlemen will forgive my calling it "sensational"—which on an overall technical basis exceeds anything that the United States or the Russians have previously done in space, could have been accomplished a year earlier except that during much of the decisionmaking period it was not clear which agency should and could be the sponsor. It is worth dwelling on this latest achievement by the United States for a moment more, because there is a unique situation applying to "Earth to Venus" experimentation that brings into sharp focus the great disparity between our scientific capability and our decisionmaking capability. Had we moved fast enough to make the decision, we could have performed Venus shots last year. We would have then found Venus in just the right position when an Earth payload arrived so it would hit or be caught in a Venus orbit. Our present, more modest experiment exceeds every other space experiment so far in the range of space which it covers, and in the information it communicates back to us. But we might have attained, with hardware that could have been built last year, the first rendezvous with Venus, an even bigger step in eventual study of the other planets of our solar system.

Venus doesn't wait or adjust its orbit to our slow arrangement-making machinery. It will not be so favorably situated again for years. When in the future we try for a Venus close-up shot, the experiment will be harder to do both in propulsion and in guidance. Our future scientific work has thus been made more difficult and, accordingly, less certain of success on each try, as well as delayed, because our technical resources are not matched by resourceful arranging to get things decided and done.

We should be excited that our Pioneer V rocket has exceeded all other United States and Russian space probes in the distance over which communications are being carried on with this Earth. But, do you know that owing to lateness in decision the United States does not possess a ground antenna installation sufficient to hold up our end of the communications? With the distance increasing every day, only the British installation—and, doubtless, the Russians'—will soon be capable of hearing our space probe's signals. We had the know-how and the plans, but we waited too long to order the work started to provide this capability, in time for this shot.

Today, there is much idle American capacity for duplicative hardware. If we chose to do so—and this is only a slight exaggeration—we could almost have space probes or ICBM's coming out of our ears. Now, I do not feel that I have a broad enough picture to presume to choose national goals and suggest how to assign resources. Hence, I am not at all saying that the present plan for exploitation of our technical resources in this Nation in either missiles or space is an im-

proper program, considering the overall. I do feel competent to say, however, that it was not our technical resources that limited what has been accomplished.

Mr. Chairman, if time permits, I would like to add 1 or 2 minutes more that relates these comments and conclusions somewhat more directly to what I understand to be one of your most severe problems. If, indeed, we recognize organization, decisionmaking, arrangement-making as the bottleneck, and therefore attack that bottleneck item to bring it more into balance with the rest of our total national capability, then I think there are three categories of items to look at. One of them has to do with people, who are in the decisionmaking business, another has to do with funding, money, support, and a third has to do with organization. I want to make it clear that when I call out what from my experience has set the pace, I am not being critical of individuals. In such outstanding people who have been appointed in recent years, as Dr. Keith Glennan, Dr. York, Dr. Kistiakowsky, we have very eminent people, and in our military group who are associated with this work, General Schriever, Admiral Hayward, General Trudeau—I am very proud of the competence that America possesses in people of that caliber. I think it is the system in which all of us work to which we must apply our attention.

It is the limitations in what the most competent people in the Nation are able to do that should concern us. Funding has been a limit in a number of areas. But I think the problem in assigning funds, in making decisions as to funding for various competitive projects is always with us. Always we can think up more important and necessary things to do than we can afford. So it gets back to the organization and decisionmaking process to make wise and timely choices. I think that here I am glad to see in the modifications that you are making to the Space Act, indications of additional clarity organizationally, and additional separation of goals and functions assigned to each of the two pertinent agencies of Government, the Department of Defense, and the Space Administration.

I believe that there has been a tendency to give almost too much attention to the problem of duplication. There are two kinds of duplications. There is the unnecessary and harmful duplication of effort—and we have had some of that in our programs in the last several years, in interagency rivalry. There is, however, another kind of duplication. This is of a kind that might be described as tolerable and almost certain to take place if you have a fast moving program.

If we apply ourselves too intensively to removing all duplication we will be setting up such procedures as to cause such handicaps in the decisionmaking process that we end up with a loss of time and a loss of much more money.

Thus, the removal of some of the pressure, the degree of coordination required, which in the past has suggested that almost everything should be coordinated to be doubly sure that there is no duplication involved—this could speed up decisionmaking.

Perhaps this had better finish my comments to allow time for questions.

The CHAIRMAN. Very good, we appreciate your very fine statement.

As I understand you, you would improve on the administration and give more latitude to the administrators?

Dr. RAMO. To the first approximation, I think that is right.

The CHAIRMAN. Rather than to tie them down with minute rules that create a labyrinth of redtape which would prevent the reaching of the early decisions.

Dr. RAMO. Exactly. I believe the further that you find it possible to go in saying to the head of the Defense Department, on the one hand, and the head of the Space Administration, on the other: "you have these goals, go after them as you see fit to the greatest extent possible," the more rapid——

The CHAIRMAN. Do you favor legislation, Doctor, that would fix the responsibilities very definitely on the individuals that have these decisions to make so that not only the Government would know, but the public would know whose responsibility it is to make decisions?

Dr. RAMO. Generally, yes, although I have to express one reservation. I think we must recognize that we have here two agencies, both of which have to be concerned with space. Obviously the Space Administration is, but I mean the Defense Department is also concerned with it. It is essential to recognize that there are going to be situations arising very, very frequently, particularly with an intensive fast-moving crash program to surpass the Russians in both areas, which will require attention at the Presidential level.

I think it is also realistic to recognize that with all of the other things that must be dealt with at the level of the President, that he cannot be brought into the mass of detail that very often will become a matter of involvement between the two agencies.

I do believe that perhaps as a temporary situation, not as a concept of the optimum type of organization as a general rule, but as a temporary situation, to recognize the unique position of space in our whole national position, in more ways than just the military, that the President must have an extension of the amount of time and attention that he can give to this through some type of Presidential assistant.

I am thinking, however, of not what has been oftentimes called a czar who directs, on space matters, both of these two important agencies, rather of someone whom we might think of as extending the total brain of the President, who can give his full time to the matters of interaction, not only of matters that affect the two agencies, but the other aspects of Government as well that affect space goals and decisions, such as State Department matters, economic matters. I believe that by having that greater amount of attention available, full time, the President will be able to act more quickly, and that the independent agency heads who are given the responsibility, when matters come up that involve interaction, will be able to reach quickly their conclusions as to what is the best thing to do, being able to rely, in effect, on more attention from the executive department level, from the top level of the executive department on those matters that go beyond their respective agencies.

The CHAIRMAN. Now, Doctor, on technical decisions, you wouldn't refer those to the President; you would have those disposed of at a technical level, wouldn't you?

Dr. RAMO. Definitely. As a matter of fact, we should try to operate so that the technical matters are disposed of within the Defense Department for its area and within the Space Administration for its.

The CHAIRMAN. What do you think of the type of council or board that was used when NACA existed, and which has been suggested in reference to this legislation? That is, a board that would review annually the programs of NASA—such board to be composed of representatives from the armed services, the AEC, nongovernmental experts, and others. What do you think of that?

Dr. RAMO. First of all, I believe that it is not too important to introduce into legislation the precise way in which information is transferred. It is only necessary to make clear that each head of each agency has a duty to transmit fully all information that is possessed by his organization that can be helpful to the other agency. There are many ways of doing that, which I think may change from time to time, depending upon projects, and I wonder whether even that kind of detail of passage of information needs to be spelled out, arranging of very particular boards which may not from time to time be the best way to arrange for the passage of information.

The CHAIRMAN. You don't like the idea, then, of a board similar to the NACA board?

Dr. RAMO. I can take it or leave it, because I think that in practice, so long as the heads are imbued with the idea of arranging to pass information to the other agency, it will get done, through this particular board or in addition to that by other types of contacts that they can so easily arrange.

The CHAIRMAN. Mr. McCormack?

Mr. MCCORMACK. I wish I had your confidence on the latter statement. We have had difficulty in getting information on this committee which we think we are entitled to. And we have run up against the veil of executive privilege on matters to which some of us don't think executive privilege applies. But all right, we will pass that by.

Dr. RAMO. That is, of course, a different problem from the one I was commenting on.

Mr. MCCORMACK. We can pass the best law in the world, and if it isn't administered efficiently and effectively, what then?

Dr. RAMO. Of course, I can't presume to be an expert on that much more difficult problem than any I have——

Mr. MCCORMACK. I know, but you are talking about what Congress does. I am not talking about a particular administration of one political party, I am talking about the executive branch, as such. We pass a law, it is up to them to administer it.

Dr. RAMO. I understand. I was addressing myself particularly to matters of coordination within the executive department. There I believe it is really the responsibility of the President to insure that when he has two organizations and when they can do best in discharging their duties by passing information back and forth, that they do so, or he should get himself a new head for the agency.

Mr. MCCORMACK. Like all of us, he is a human being, and he has many problems, as you have indicated.

Dr. RAMO. That is one reason why I suggest that he must have a special assistant to assist him in insuring that that kind of thing is taken care of.

Mr. MCCORMACK. He has one now, hasn't he, Dr. Kistiakowsky?

Dr. RAMO. That is not my understanding of the duties of Dr. Kistiakowsky.

Mr. McCORMACK. Not in accordance with statutory law, but the President does have a scientific adviser; formerly it was Dr. Killian.

Dr. RAMO. Let me distinguish between the President's scientific adviser, on the one hand, and the sort of thing that I am thinking of as an added ingredient, if only for a temporary period in connection with space.

Mr. McCORMACK. Don't draw any inferences from my questioning, I am just trying to explore.

Dr. RAMO. Yes; I understand.

Mr. McCORMACK. Do you believe that all research should be in one agency?

Dr. RAMO. I think it is impractical to try to put all research in one agency.

Mr. McCORMACK. That is, you think that the military should have jurisdiction over research which is connected with military missions?

Dr. RAMO. I certainly do.

Mr. McCORMACK. You don't think they should be subordinated to the civilian agencies in the exercise of their jurisdiction?

Dr. RAMO. I do not.

Mr. McCORMACK. How are you going to assure them the exercise of their jurisdiction?

Dr. RAMO. How are you going to assure it to the military?

Mr. McCORMACK. Yes.

Dr. RAMO. First of all, it seems to me that if the Defense Department is given the job of everything from research to complete execution in the military field, we get down here then to judging the performance of that organization. I don't think you can assure it by legislation.

Mr. McCORMACK. Well the select committee, of which I was chairman, thought it had assured it when we passed the present organic act. We found that a different interpretation was placed upon the word "except" by the executive branch than the committee had intended. Congressional intent was clearly manifested by reports and speeches by Members when the bill was pending in the House. But you do believe that in the world of today the question of survival should be uppermost in our minds?

Dr. RAMO. I certainly do.

Mr. McCORMACK. Now, we had the civilian-military liaison committee; you are acquainted with that?

(Dr. Ramo nods.)

Mr. McCORMACK. Are you also aware of the fact that it was never given an opportunity to function?

Dr. RAMO. Perhaps not completely, but I have some indication that that is the case.

Mr. McCORMACK. Yes. The evidence seems to be that it was not utilized to the extent that it could have been, as was intended by Congress. I will put it that way.

Dr. RAMO. Yes.

Mr. McCORMACK. Now, do you recognize that with all these stupendous problems between Defense and NASA in this area of space, where there might fall within the twilight zone or the gray zone matters not clearly identified as peaceful or military, that it would be an onerous task for the Secretary of Defense and the Administrator of

NASA, with their many other manifold duties, particularly the Secretary of Defense to devote the time necessary to deciding these questions of jurisdiction?

Dr. RAMO. I agree.

Mr. MCCORMACK. And do you think there should be, as we intended, some kind of an every-day working committee that could meet and discuss and recommend, and if administratively supported, it could be a very effective organization?

Dr. RAMO. I must confess to a bias.

Mr. MCCORMACK. You what?

Dr. RAMO. I must confess to a bias, which is to have an absolute minimum of committees involved in the interactions——

Mr. MCCORMACK. Well——

Dr. RAMO. And——

Mr. MCCORMACK. Pardon me, I didn't mean to interrupt you.

Dr. RAMO. And to substitute as much as possible the concept that the Defense Department should do everything that it feels necessary with a minimum of checking beforehand, making available knowledge of what it is doing. Let me be more specific by an example that appears, I have noticed, frequently in the discussions here.

The so-called launch vehicles, the boosters—now, I happen to know of a new, very highly classified project, with which the organization that I am with is associated, which suggests that the military will need large boosters. I do not see that class of large boosters as necessarily here as soon as possible in the survival-of-the-Nation's interest if it is going to be required that the booster be worked out in such coordination with NASA to insure it's also serving for their very different purposes.

Now, if we are going to get these things done more rapidly, I think we have to accept the apparent higher costs of a certain amount of duplication, which I think in many instances is only an apparent one, and get the job done faster, have a better world position, and I think in the end, end up spending less money.

Mr. MCCORMACK. Of course, we all intend that there be coordination and the elimination of duplication as much as possible. NASA has control of the big booster. It seems to be logical for NASA and the Defense Department to concentrate their efforts on that project within NASA to prevent unnecessary expenditure of money and unnecessary duplication.

I have exhausted my five minutes. I just want to lead up to one question. Would you recommend that it be left to the Secretary of Defense and the head of NASA?

Dr. RAMO. Plus a presidential assistant, who extends the President's time, in effect, to make possible his decisionmaking.

Mr. MCCORMACK. Do you think that office should be created by statute?

Dr. RAMO. I do not feel that I know enough about either the law or other aspects involved to say whether it has to be. Probably it does not have to be.

Mr. MCCORMACK. Suppose there is a dispute between the Secretary of Defense and the Administrator of NASA. It is going to be decided in accordance with the one who is in most favor in the White House at the time; isn't that so?

Dr. RAMO. I think, however, that the White House——

Mr. MCCORMACK. I am not talking about a particular President; I am just dealing with human nature.

Dr. RAMO. I understand. And trying to stay within that line of thought entirely, such a dispute has to be settled by the President. But my thought is that the President will make a better, on the average, better and earlier decision if he has as part of his staff an individual of high stature devoting his time entirely to these space issues.

Mr. MCCORMACK. Nobody is disputing that. Nobody raises that question at all. The President is going to do that anyway, and he should. He should have somebody to look into these matters and advise him. But on the working level, don't you think that great use could be made of an everyday working committee in solving the questions that arise between both agencies?

Dr. RAMO. I think in practice it turns out that if you set up a particular committee, that there will be—it will simply be one of, let's say a dozen ways in which the two agencies interact and provide information to each other.

Mr. MCCORMACK. Well, Mr. Douglas, Deputy Secretary of Defense, was before us the other day, and as I remember his testimony, he said if this committee were eliminated they would create a panel. It is the same thing, another name for a committee, a panel.

Dr. RAMO. That is right; I am sure they will have their committees and panels, but I doubt whether this is necessary in legislation, and it should be allowed to change to suit the times and the projects so coordination by one committee serves for 3 months and by a different one for another 3 months for some other matter with the detailed rules changing. It seems to me legislation here might only prove a handicap.

Mr. MCCORMACK. Even on military matters, the Secretary of Defense has the Joint Chiefs of Staff to advise him, doesn't he? You say in this field that there shouldn't be anybody?

Dr. RAMO. I didn't mean to express such an opinion. I meant it is a question of how formal is the process by legislation.

The CHAIRMAN. The gentleman's time has expired.

Mr. Fulton.

Mr. FULTON. We are certainly glad to have you here, because we know of your wide experience. Do I understand that you believe that the space programs of NASA and the Defense Department should not be merged?

Dr. RAMO. I do not believe they should be merged.

Mr. FULTON. The question then is: Should the launch vehicle portion of the NASA program be merged with the Department of Defense programs on a limited basis, so that those programs will be done jointly?

Dr. RAMO. I believe that within another year, certainly within 2 years, it will be perfectly clear that if we really mean to place the maximum responsibility in the Defense Department for defense matters, and for pure research in space conquest of a peaceful type in NASA, on the other hand, that we will find launch vehicles not so special as we now believe them to be, but belonging in a category of other common interests, including test ranges, guidance equipment, major facilities of all kinds, and major research investigations.

And that they will be wise, the two heads, if they make arrangements to rely on each other, but still have the independent capability of going out and doing the special things that they need for the responsibility that has been given to them. And, in particular, I believe that the concept of launch vehicles being in one place will become out of date. It may be that right now we are doing about the best thing by concentrating in one place. But there will grow a family, with too great a spread of differences, in launch vehicles to make that concept hold.

Mr. FULTON. So that you do feel there is a specific requirement at the present time for large multipurpose boosters that could be used for military or peacetime purposes?

Dr. RAMO. I am afraid we have the danger of forcing the carriers, the boosters, into a concept of general purpose that pretty soon will make it look as though we are trying to design trucks and airplanes to carry something the same distance even though they are not suitable.

Mr. FULTON. That is the point of my question.

Dr. RAMO. For the whole spectrum of their duties.

Mr. FULTON. That was my next question. Do you think they are different from trucks or airplanes?

Dr. RAMO. Initially, gentlemen, it really comes down to this: the military had all the launch boost vehicles starting from ICBM's and IRBM's. The smart thing for NASA to do was to use those to the fullest to make our first step in space. But a rocket that lands on the Moon with a man and returns requires, I am certain, a class of boost vehicle that is substantially different from the type of launch vehicle that places in orbit military apparatus of kinds that we can already envisage, but which have not yet had public discussion because of security.

Mr. FULTON. I began at 19 minutes of; so, if you will tell me when I have reached 14 minutes of, I would appreciate it. There has been a question of where the research and development should be. My own feeling is that there should be room for basic research in both the NASA budget and the military budget. So I would not restrict the military budget for research and development merely for military missions. I would give them a wider purpose. Would you recommend that, too?

Dr. RAMO. I believe that starting from the concept that the military has military goals, defense goals, the words "research and development," particularly the word "research," is not very meaningful unless it allows a pretty broad spectrum.

Mr. FULTON. I agree with that. There is something on which I would disagree with you, however. Jodrell Bank, of the University of Manchester, England, developed the Jodrell Bank scope, a very fine instrument. I have been over there with some of the staff, and I learned a lot about that scope. We found there was extra time that was not being used by the Jodrell Bank people, and we found that Dr. Lovell was short of funds because the British Parliament subcommittee had cut him down. Now, under those circumstances, I spoke with Dr. Abe Silverstein, of our space programs, and urged, rather than build another facility, we might save taxpayers' money by making adequate use of the spare time that had become available,

and likewise keep a major scientific instrument of the Western World operational.

Therefore, I disagree with you that there was something wrong in our using British facilities. We are building facilities, but not duplicating facilities of our allies. Now, in the context of your previous statements, I would assume that the total amount spent by NASA, for example, $915 million proposed for this current year, is about right. You wouldn't recommend an increase in the space program by maybe $4 billion, as the National Rocket Society would, and therefore raise taxes, but you would simply hope for better management and quicker decisions in the program; is that not right?

Dr. RAMO. That is pretty close to my views.

I might differ by a 10- or 20-percent factor from the next fellow in estimating the amount that would constitute a sensible program, but it wouldn't be a $4 billion to $5 billion program as against a billion.

Mr. FULTON. Thank you very much.

The CHAIRMAN. Thank you.

Mr. Miller?

Mr. MILLER. Doctor, do you contemplate that there would be any difficulty at our launch sites, confusion that may exist there if we turn them all over to the DOD? Would it be necessary to build another Cape Canaveral for NASA?

Dr. RAMO. I believe that—again, this is very difficult to legislate—I would hope and I would have some confidence that by giving the maximum of license, you might say, to the heads of these agencies, that they would, nevertheless, choose, knowing that they are going to have always the problem of limited funds in many things they want to do, they would choose to use the other man's facilities and to make arrangements to do so.

I believe, however, that if it turned out to be the case that Cape Canaveral was too busy with defense matters to enable the head of the Space Administration to believe that he was able to move as rapidly as he has to to meet his responsibility, in part at least, in major part laid before him by this committee, that it becomes his obligation to push as hard as he can for his own launching facility.

Mr. MILLER. The impression that you leave with me is that you want the military to handle this whole thing and what the military doesn't want to handle we will throw off on NASA. NASA then becomes the poor cousin of the rich military?

Dr. RAMO. That is not——

Mr. MILLER. I would like you to correct that impression, if I am wrong.

Dr. RAMO. That is not the impression I sought to create.

Mr. MILLER. That is the impression you made on me, but I am only one member of the committee.

Dr. RAMO. I believe there is a permanent good organizational concept here that says: Let the Defense Department do everything it needs to for defense, including such space activities as it needs, and let there be, in addition, a civilian space agency concerned with peacetime uses of space, space conquest, space research, and I believe the Space Administration should be given whatever it needs to meet the national goals in that respect.

I don't consider that a poor cousin allotment at all, because I consider it extremely important.

Mr. MILLER. What proportion of the work of your company is done with DOD as against that which is done with NASA in terms of the funds that your company receives?

Dr. RAMO. Well, in the space and long-range ballistic missile field, perhaps about 15 or 20 percent is NASA money, as against Department of Defense. That is a guess. I could be a little bit more precise.

Mr. MILLER. All right. Then it is about 4 to 1?

Dr. RAMO. About 4 to 1.

Mr. MILLER. I understand why you feel kindly to DOD.

Dr. RAMO. Well, on the other hand, let me point out in the kind of things we are doing for NASA, as a private competitive industry representative here, we would be delighted to do more for them.

Mr. MILLER. Certainly you would, but as a businessman and with a good profit motive your interest is in the place where you get the most money, and you get $4 to $1 out of DOD. Therefore you tell us that DOD should be the No. 1 man in the picture.

Dr. RAMO. I didn't intend to give the impression that DOD would be No. 1.

Mr. MILLER. No; I am sorry. But then—my time——

Dr. RAMO. It seems to me there are two roles, and each should be allowed to develop each to its fullest.

Mr. MILLER. I would be glad to talk with you privately or any other time, but frankly that is the impression you leave with me, and I think I understand the reason now.

The CHAIRMAN. Include me in that private conversation, too. I would like to talk with the doctor also.

Dr. RAMO. All right.

The CHAIRMAN. Mr. McDonough?

May I say this—it has no reference to Mr. McDonough or Mr. Miller or anybody else on the committee. We are running into some difficulty. We had also hoped to consider the report of the Subcommittee on Patents in executive session. If it is the will of the committee, we can continue until about 11:30. That will leave 30 minutes for consideration of the subcommittee's report. The staff member wants to explain the report; then we might be able to get together on that report before noon.

Mr. ANFUSO. I so move, Mr. Chairman.

Mr. BASS. Mr. Chairman, I am a member of that subcommittee.

The CHAIRMAN. I know. You are a very valuable member, too.

Mr. BASS. I am sorry to say I have to leave about a quarter of 12.

Mr. KING. I am in the same position.

The CHAIRMAN. Do you think 15 minutes will be enough for you gentlemen?

Mr. BASS. Actually, I have an appointment at 11:30; but I was thinking I could stretch it.

Mr. QUIGLEY. Mr. Chairman, might I be heard? I would like to point out that this was not a unanimous report of the subcommittee, and I think we would be doing the full committee a disservice if we tried to dispose of it in 15 minutes.

Mr. HECHLER. I move that at 11:20 we proceed with patents.

Mr. BASS. I don't think we can dispose of this between 11:20 or 11:30 and 12 o'clock.

The CHAIRMAN. We can't do it this afternoon with three votes expected on the House floor; we can't do it tomorrow, and we can't do it Monday. We have hearings scheduled for both days.

Mr. BASS. Well——

The CHAIRMAN. Since two members of the subcommittee can't be here, we had better postpone it. We will postpone it until next week, if there is no objection.

Doctor, this will give us more time to question you on this matter. Mr. McDonough.

Mr. MCDONOUGH. Dr. Ramo, we are very happy to have you here. We recognize your broad experience in this field and we are glad to know what you think is necessary to expedite the program. As a practical man, both in basic research and in the manufacturing side, and dealing, as you do, with both NASA and the Defense Department, in which of the two agencies do you find the decisionmaking more expeditious, and in which is efficiency on a higher level?

Dr. RAMO. Well, it may be that I should point out here that I have, in our company organization, I have left the job of president of our subsidiary, Space Technology Laboratories, which has had the detailed dealings with NASA in the last year or so, and thus it is not easy for me to distinguish between the two. I have no real basis for that kind of judgment right now. They both seem to me about the same, suffering from the same problems that every issue that arises takes such a long time to be mulled over. This is not something common to one alone.

Mr. MCDONOUGH. You mean it is an inherent characteristic?

Dr. RAMO. It is an inherent characteristic of the way our Government generally operates, and I realize that it is much easier to criticize a process than to invent ways to make it better, preserving so many other characteristics of our way of government that we choose to make fundamental.

Mr. MCDONOUGH. You can't legislate that kind of action. You can set it up in legislation and then you have to set up an organization to see that it is enforced.

Dr. RAMO. That is right. I think there are certain fundamentals that I am trying to express, and I don't know but what I may be doing it clumsily. The further you can go in setting up an organization with a clear function and giving its head as much responsibility and clear sailing as possible, the less cumbersome is the decisionmaking operation.

Mr. MCDONOUGH. I notice in your statement you say that Pioneer V could have been shot a year ahead of time.

Dr. RAMO. Yes.

Mr. MCDONOUGH. It was delayed due to indecision along the lines as to who was going to be responsible for it. This is news to the committee, as far as I am concerned. It is news to me.

Dr. RAMO. Well, let me elaborate on what was behind that statement in detail. There was a period during which it began to be clear that there would be a NASA and that it would be responsible for these things, but NASA did not yet exist. Meanwhile, the Department of Defense had ARPA, but ARPA knew it was not going to be doing

this particular work. During this period we were engaged in making clear what could be done, technically, with available hardware, if we only started early enough. During that period there was a—something approaching a vacuum. So there were a number of months during that particular period.

Now, I think that during most of that time this committee was engaged in its initial studies as to whether NASA should be set up. That is why I think that particular kind of thing may not have come to the attention of this committee.

Mr. McDonough. Now, so far as the technical know-how and the ability to produce the hardware, in our industrial structure of the Nation, do you see any problem areas there? Are we doing the most we can on the practical side of producing the hardware for space exploration?

Dr. Ramo. Well, of course, we have limitations there, but inasmuch as we could have produced more—for example, having started space probes towards the Moon within a year and a half ago, something of that order, we could obviously have had more shots. We certainly had the capability, for example, of making more Thor boosters, which were used in the process. The tooling existed, the organizations that make those stood ready to make more. Had we made more, our reliability would have increased more rapidly so that we would have reached the particular possible goals, technically, at an earlier date.

Mr. McDonough. Do you know of anything that is postponing the progress on Mercury?

Dr. Ramo. I don't have the detailed exposure to that specific program to be able to comment on that.

Mr. McDonough. What do you think of the progress we are making toward the creation of million and a half pound thrust engine?

Dr. Ramo. Well, again, while I don't have the details, I can perhaps be helpful to you by making this comment: You will notice that in the beginning how many months—here you have only to look at the newspapers to realize how many months we spent discussing whether such a program should be, who would do it, and we even made the matter of the exact number of pounds of thrust one of public discussion, a highly technical item that should clearly in the best possible organization ideally have been decentralized to a group of experts who would decide it without the need for major discussion. It took us a long time to get it started. It may be going as rapidly as possible, now.

Mr. McDonough. I intended to yield to Mr. Fulton for a question.

The Chairman. The gentleman's time has expired.

Mr. Anfuso.

Mr. Anfuso. Dr. Ramo, I think you have made a very excellent statement, both orally and in writing. As I understand your testimony, first of all, you recognize a very serious bottleneck which is in decisionmaking, as you have put it, and you would like to avoid that?

Dr. Ramo. I would like to minimize it. I am realistic in knowing that it can't be avoided.

Mr. Anfuso. You would minimize it. What I think you would like to create is some kind of an agency in the executive branch, preferably in the White House, which won't interfere with anything that DOD is doing, nor with anything that NASA is doing, but which,

whether you call it the office of the assistant to the President or what, will be properly equipped with scientists and advisers who will know exactly what is going on in NASA and in the Defense Department and try to avoid delays in decisionmaking? Under that subdivision (b), of section 309 of the bill, where both agencies cannot get together, it will be up to the President to make the decision; for example, as to a new launch vehicle.

Now, this executive assistant that you speak of, who will have the proper scientists advising him, who will know exactly what is going on with NASA and in Defense, who is a high-caliber individual, a real topnotch individual, will be able to keep in touch with both agencies and avoid a great number of the problems getting to the President? In other words, we did have in the White House some time ago a Sherman Adams who relieved the President of a great number of problems. I don't mean to create another Sherman Adams, but we certainly should try to create an assistant who will relieve the President on problems concerning space. Obviously the President cannot be familiar with everything that is going on in that field.

Now, whether or not that position is created by law or by Executive order, it is immaterial to you; am I correct about that?

Dr. RAMO. I am not competent to judge whether it should or should not be created by law. I think your description is different from what I had in mind in one respect. I do not think of the President's Office as adding an agency—rather, pretty close to one man who in effect makes it possible for the President to give attention to the total area of space above and beyond those things—and there are some things that aren't in the Defense Department or Space Agency, involving, for example, foreign policy implications and psychological warfare implications.

Mr. ANFUSO. Then, Doctor——

Dr. RAMO. I don't believe that is an agency——

Mr. ANFUSO. Let's not call it an agency, but let's call it an office, it is an office in the White House.

Dr. RAMO. Yes.

Mr. ANFUSO. With a real, topnotch man at the head of it.

Dr. RAMO. Yes.

Mr. ANFUSO. Let's create that kind of an office, which will get along with Dr. Glennan and the Secretary of Defense, headed by a man who will devote his full time to space, a unique position in this day and age; isn't that correct?

Dr. RAMO. That is correct.

Mr. ANFUSO. That is what you want to create?

Dr. RAMO. That is correct.

Mr. ANFUSO. In that I am fully in accord.

Now, then, you spoke about the language of decisionmaking. I don't believe you were trying to imply by that that it was of a political nature?

Dr. RAMO. No, definitely not.

Mr. ANFUSO. That is all.

The CHAIRMAN. Mr. Van Pelt?

Mr. VAN PELT. I just want to say, Doctor, I am certainly impressed with your statement, and I think you have made a great contribution to our deliberations on this bill. I am certainly in accord that we

have got to cut down the red tape and eliminate as many decision-making operations as possible if we are going to progress.

The CHAIRMAN. Mr. Mitchell?

Mr. MITCHELL. No questions, Mr. Chairman.

The CHAIRMAN. Mr. Bass? He has gone.

Mr. Quigley?

Mr. QUIGLEY. Doctor, have you reviewed the pending legislation before this committee?

Dr. RAMO. I don't know that I have reviewed it all. I have read such documents as this one [indicating], if that is what you are referring to, rather thoroughly.

Mr. QUIGLEY. Do you think it will contribute toward the solution?

Dr. RAMO. Yes, I think it will.

Mr. QUIGLEY. Improve the decisionmaking process?

Dr. RAMO. I think it does, yes.

Mr. QUIGLEY. What do you base that opinion on?

Dr. RAMO. First, because it tends to add greater clarity in the division of roles and functions between the two organizations. It makes clear that there is a Defense Department with a clear mission in space, that it must be allowed to progress in; it makes it clear that there is another important mission for the civilian space agency, which it must be allowed to progress in.

Secondly, it appears to me to cut down the detail of formal, forced interaction and coordination.

Mr. QUIGLEY. Does it do that or does it just substitute?

Dr. RAMO. Well, I think that it does. This is perhaps only intuitive with me, because, as Congressman McCormack has indicated, it is very difficult to legislate some of these things, the way they are spelled out. I read it that way. If I were in a position of high responsibility in either Defense or the Space Administration, I would feel that I had clearer authority to move ahead, adjusting the amount of coordination with the other head in the most sensible day-to-day way, without having too many rules and regulations concerning the particular way in which the coordination is handled.

Mr. QUIGLEY. You think the chances of this getting better would be improved by the passage of this bill?

Dr. RAMO. I think so.

Mr. QUIGLEY. Now, assuming Congress does pass this particular section of the bill, you still would think it is essential that a space-age Sherman Adams enter the picture at the White House level?

Mr. FULTON. May I say that you are the first Democrats that have wanted to put Sherman Adams back into the White House.

Mr. QUIGLEY. I don't know whether that is an accurate interpretation of my remarks. I want the record to show that I was always a keen admirer of this man's ability to make a decision, and I am not really concerned, as is my colleague from New York, whether this man could get along with Keith Glennan or with Tom Gates; if he could get the decision made and make it stick I think he would be making a great contribution to the future of this country, if it is going to have a future.

Dr. RAMO. All right.

Mr. QUIGLEY. The point is, even with the legislation before us on the books, the type of person that you are suggesting, and that I am thinking about, is going to be an essential, is he not?

Dr. RAMO. Let me say it this way: I think it is completely unrealistic to imagine that you can have a strong NASA, which I believe in, and a strong Defense Department under strong leadership, both pushing ahead without a continual procession of items which will require Presidential attention, since they both report to the President. I think it is also unrealistic to imagine that the President can have the time to place himself quickly in a position to check all of the other perimeters that are involved in addition to the material brought to him by these two agencies with their busy heads who are pushing their particular important but nevertheless, from the President's standpoint, narrow programs.

He needs some assistance. I would argue for the minimum and a strong aide who makes it his business to follow this and helps set up the decisions so that the President can act quickly. But he does not have a direct edictmaking control over the two important heads.

Mr. QUIGLEY. He does not have?

Dr. RAMO. He does not have a direct edictmaking power. That would make him a czar over all of space, which I think would be another source of conflict. But he does cause the President to be able to make the President's decisions more rapidly, with high wisdom more rapidly. He is an extension of the President's brain, as I see it.

Mr. QUIGLEY. What you are saying is we need a strong NASA, a strong DOD, and a strong President?

Dr. RAMO. And a strong President, and the President is an awfully busy man, and he should have some extension.

Mr. QUIGLEY. He needs someone that will add to his strength.

Dr. RAMO. Right.

The CHAIRMAN. The gentleman's time has expired.

Mr. Wolf.

Mr. WOLF. Thank you, Mr. Chairman.

Dr. Ramo, it appears to me that you are the victim of a very fascinating paradox. On the one hand, you are obviously an authority that should be recognized and should be heard on these subjects. On the other hand, you are in an excellent position to profit by our effective utilization of your recommendations. Without questioning your motives in any way, it makes it difficult to assign weight to what you say. I want you to know that I am not doubting your good motives, and I am sure that no member of this committee has. But I hope you understand the position that it puts the members of this committee in, trying to give weight to your testimony.

(Dr. Ramo nods.)

Mr. WOLF. I was quite fascinated by your comments regarding the Venus probe, and also the current probe, that ultimately we hope will go around the Sun, to the effect that we don't have the electronic equipment; we are reaching a point now where our own electronic equipment is not adequate to do the job.

Now we have to rely on the British, you say. Are we later on going to be in a position where the British equipment won't be adequate and we will have to ask the Russians to monitor the signals we receive from these probes?

Dr. RAMO. On this particular shot the British antenna installation is adequate.

Mr. WOLF. Is adequate?

Mr. MCDONOUGH. Will the gentleman yield at that point, just for an observation?

Mr. WOLF. All right. I am awfully short on time. Go ahead.

Mr. MCDONOUGH. I think Mr. Fulton cleared that up. We don't need duplicate apparatus for that purpose. We have got it in England, our ally. They are working with us.

Dr. RAMO. I think I expressed my thoughts poorly on that subject. I agree with Congressman Fulton's comments—that we should cooperate with the British, continue to cooperate with the British, and in this, if they have an element of total western system, this is fine. It turns out, however, that my expression was motivated in part by knowing of other space probes and projects, and knowing that sooner or later the British system does become inadequate. We do have an antenna program in the United States. The earlier that that is available to us, the more we shall be able to do. Since we don't really have a broad program of permanent reliance on others, I was thinking about the broad problem of assuring our installations in time and used this special one as an example. We didn't really plan to use the British installation on this shot—we had to, by default, because we took too long to decide.

Mr. WOLF. So that either we are going to have to develop more adequate systems of our own, or we are going to have to start getting along with the Russians and hope we can sit in their satellite tracking stations tracking our own satellites.

Dr. RAMO. I think it is a lot safer to plan on the former.

Mr. WOLF. Do you know of anything of this kind now being done to overcome this handicap?

Dr. RAMO. It is my understanding that we are engaged in programs that will eliminate this particular shortage.

Mr. WOLF. Is this 600-foot Navy telescope in West Virginia going to help us?

Dr. RAMO. I do not know enough details about it to comment—I think perhaps I had better not, leave it to others who are closer to it.

The CHAIRMAN. The gentleman's time has expired. Before Mr. Hechler proceeds, I might say we are privileged this morning to have students from Wheaton High School, Wheaton, Md., accompanied by Mrs. McQue, the instructor. We are also pleased to have a group from the Hanna-Harrison School of Practical Nursing and Housekeeping, located in Georgetown.

We are glad to have you here this morning.

Mr. Hechler?

This is peculiarly appropriate, because Mr. Hechler is a former schoolteacher.

Mr. HECHLER. Dr. Ramo, I see that the amendments to the act, section 309 are headed "Coordination and Cooperation." I gather from your testimony that you feel that leadership and decisionmaking are really more important than advice, consultation, coordination, liaison; is that correct? Is that a fair statement?

Dr. RAMO. That is a fair statement.

Mr. HECHLER. I certainly compliment you on that statement, because I think many of our discussions before this committee have unfortunately gotten into the area of how to create a better post office

than how to create a better quarterback. I think that you have really pinpointed the need that we have for leadership.

Now, isn't it equally necessary that the people of this country, not the people involved immediately in the program, but that all the people in this country understand the program, how it is operating, what its goals and what its objectives are, in order for it to move forward?

Dr. RAMO. I think we need to increase the fraction who do. [Laughter.]

Mr. HECHLER. Well, this is where my experience as an educator unfortunately colors my views on this. But it seems to me that you have made an excellent suggestion here, and I would concur with the other members of the committee that have also brought out the support for your suggestion that someone in the Office of the President act as a focal point for bringing decisions to a quicker head. Is that a fair statement of what you are seeking?

Dr. RAMO. That is.

Mr. HECHLER. To bring decisions to a quicker head, I have advocated here a somewhat stronger individual, entitled a Director of Space and Aeronautics, who would be in the east wing of the White House and would operate much as Fred Vinson did in the economic stabilization field. I think that this is necessary in order that the people understand just exactly where the decisionmaking process needs to be pushed forward. I am a little bit concerned that if we simply talk in the committee about the necessity for having an adviser under the President, that nothing will be done unless we set it out in legislation.

Dr. RAMO. I am sure you are a better judge of that than I am. The only thought I can add, perhaps, is that I am sure this will depend a great deal on the President and on the individuals who are at the same time Secretary of Defense and head of the NASA, as well as the individual chosen. If, even though this individual does not have decentralized to him the powers of the President to be able to make personal rulings on matters of problems between NASA and Defense, if he is a strong enough and competent enough individual, if the President relies on him heavily he becomes as influential as these circumstances will permit, in making for a good Presidential decision.

Whether or not you can legislate the degree of authority to be vested in this man is something I am rather incompetent to comment on.

Mr. HECHLER. Let's look at the decision making today on this issue and direct our attention as to how this is going to be achieved. We can talk about it in this committee, maybe there will be a story in the paper that you advocated it, but what would happen now if we left it there? I am afraid nothing would be done unless we wrote it into the kind of legislation that would stimulate the discussion that would force this type of action. Now this is the type of decision making that involves you, involves the committee, that involves the American people. We are now making a decision which will help the making of future decisions.

Now, writing it into legislation I would suggest would be a better way to stimulate the action on it.

Dr. RAMO. I think your words are quite convincing on it, Mr. Hechler.

Mr. HECHLER. That is all.

The CHAIRMAN. Mr. Daddario.

Mr. DADDARIO. Doctor, you have broken down the bottleneck into three sections; you have people, funding, organization and decisions making. You seem to skip over the first two and put most of the emphasis on organization and decision making. Actually, don't you have the same problems of organization and decision making in the funding field that tend to slow down these projects?

I have talked to people who have said that it has slowed them down a great deal. One party in particular, whose name I won't mention, said that he can spend his own company's money five times more efficiently than he can spend the Government's money, when he is involved in this kind of a program.

Now, wouldn't you say that the same problems that arise in making decisions as to what we will do are also present in the funding area?

Dr. RAMO. Absolutely. As a matter of fact, I intended to convey that. When I used people, funding, and decision making, and then dismissed people and funding, it was because the people are outstanding and the funding problem is more one of decision making than the amount of money. This was intended to convey that we are somewhere near the right amount of money and we especially would be near the maximum that it is required to do the job if we were to improve our organization and decision-making apparatus. We lose money, in effect, by being slow to decide what to do with it and what to spend it for.

Mr. DADDARIO. We lost money by being slow, and if we could straighten out this problem, if we could be more efficient, we would actually have more money to put into the project, itself?

Dr. RAMO. Right.

Mr. DADDARIO. This goes to the question of how contracts are arrived at, how moneys are received by the company, the longer a company has to wait, for example, the longer and the heavier its borrowing expenses are, the greater the expenses are for the overall project; all of this could be narrowed down and could become more efficient, could it not?

Dr. RAMO. Right.

Mr. DADDARIO. Doctor, there is one thing that confuses me about your statement in separating the space effort and the military effort. You said something about the fact that perhaps we are designing a truck to do the job some other vehicle could and should do. But have we reached the stage we are able to overcome the barriers that prevent us from going into space and we can now define one vehicle in such a manner as to set it apart from the other? Isn't it so that when we develop a vehicle that is a better one, that we can immediately adapt it to do a better job either for peaceful purposes or for military purposes?

Dr. RAMO. This will happen sometimes, and sometimes it won't. And you need the technical flexibility to make the decision based on the issue. Some launch vehicles the Defense Department needs are entirely satisfactory for NASA, and should be used by NASA. Some vehicles that only NASA appears to need today will turn out to be

so close to what the Department of Defense needs, next year or the year after, that it would be absurd for a competent Defense Department to decide to develop its own.

On the other hand, there are also some launch vehicles that are so different for the two classes of missions that it will hurt both efforts, end up costing more, to create some sort of a peculiar hybrid under a great deal of committee coordination, having it later, thus requiring even more expenditures on a crash basis to do something that should have been done a year or so earlier, before, rather than after the Russians.

Mr. DADDARIO. Well, who would you have decide that there is or is not duplication; or who would decide that some duplication is wasteful, and that some duplication is efficient, and therefore should be allowed to continue?

Dr. RAMO. The first rule is to take—to be willing to take the risk that there will be duplication, and not worry quite so much about it, and let NASA and the Defense Department do what they feel they have to do to get their jobs done. Then after the act, rather than before, to criticize their expenditures and put them in a position of comparing what they have done and ask, "Why did you have to have two vehicles when they seem so much alike?" Put them always under the pressure to cut down the amount of independent action, force the greatest possible dissemination of information by this process, and then recognize that since each will have always a limited budget, no matter how liberal it may be, each has a basic interest in using something of the others and using his funds, instead, for something else that he would like to do.

The CHAIRMAN. The gentleman's time has expired.

Mr. Moeller?

Mr. MOELLER. Dr. Ramo, you stated before that some 15 to 20 percent of your work was for NASA. I assume 80 to 85 is for DOD?

(Dr. Ramo nods.)

Mr. MOELLER. Would you know the comparison of the amount of work done by your concern as contractor for NASA and DOD, in relation to that done by others? Are you one of the major——

Dr. RAMO. Are we a good example, you mean, for this particular point?

Mr. MOELLER. Yes.

Dr. RAMO. I think the only way I could guess that would be to look at the budget and to take those things that involve space and long-range ballistic missiles at DOD as a package, and believe DOD's budget is about twice the size of NASA in this field.

Now, you could get different numbers, depending upon what you include in DOD that has some relationship to this program. I think you probably will find some organizations—on the average, most of the large organizations dealing in this field will have that ratio, and I think most of them, are not too concerned with which part of the Government has the responsibility. They adjust themselves to seeking contracts with whatever agency has the responsibility.

Mr. MOELLER. Now, you are one of the first contractors to come before us and so strongly recommend cutting of redtape. I have a statement here, which I don't intend to read before the Committee, but I would like to have you see it. I would like for you to provide me

with an answer to the statement, refute it, or where it is substantially correct, confirm it. Would you give me your answers on the basis of the financial records of Ramo Wooldridge?

Dr. RAMO. Yes, I would be very happy to.

(Mr. Moeller's statement and Dr. Ramo's response will be found in the files of the committee.)

The CHAIRMAN. Mr. Chenoweth.

Mr. CHENOWETH. No questions.

The CHAIRMAN. Doctor, I would like to ask you a question or two, and I think Mr. McCormack and Mr. Fulton both have some additional questions.

Mr. McCormack, you have to leave at 11:30.

Mr. MCCORMACK. I have no questions.

The CHAIRMAN. I would like to ask you this question in line with the questions which you have been asked. Frankly, I must plead a feeling of interest in the Defense Department, since I put in 24 years of my time in Congress with Defense Department legislation. But, suppose you have a disarmament program, what is going to happen to your space program if it is 85 percent in the Defense Department?

Mr. RAMO. The 85-percent figure—I was estimating applied to the work being done by our company. In space work there is closer to an even split. If you add long-range ballistic missiles which are very closely related to space then the Department of Defense is perhaps two times the budget for NASA. That was my guess.

Mr. MILLER. Would the gentleman yield?

The CHAIRMAN. Yes.

Dr. RAMO. However, the question——

The CHAIRMAN. I yield.

Mr. MILLER. In making the estimate of two against one, the Department of Defense is carrying on certain production work in this field; for instance, they are spending a lot of money on Polaris production.

Dr. RAMO. Yes, sir.

Mr. MILLER. You are not going to count that in?

Dr. RAMO. I am not counting that in, no.

Mr. MILLER. Just the R. & D.

Dr. RAMO. And what you might call pilot production.

Mr. MILLER. That is not research and development.

Dr. RAMO. At any rate, the question—I suppose one would have to assume that in the case of a major disarmament program, the Defense Department's budget would go down much more in ratio, in proportion than NASA's would. There still would remain peaceful exploitation of space.

The CHAIRMAN. But you would have to start from the beginning, or you would have to start by transfer.

Dr. RAMO. I think you would have to start by transfer.

The CHAIRMAN. I am one who hopes that some day the world may witness some rational disarmament. I am not a pessimist, by any means; I believe that it might happen.

Now, if the Defense Department has all the know-how and the technique and the ability to do this work in 85 percent of the cases, or say two to one, which would be 66⅔ percent of the cases——

Dr. RAMO. Yes.

The CHAIRMAN. Then along comes a disarmament program; what will happen to the legitimate ends of the space program that you and I want to see followed through?

Dr. RAMO. I think if that should happen, projects that are considered primarily or most importantly needed by defense today, but which should go on for peacetime pursuits, would simply have to be shifted. You would have a major shift to NASA to contemplate.

The CHAIRMAN. Some of our witnesses have thought that all space development work should be in one department, and that one department ought to be the Department of Defense.

Now, if that were the case, we would have the problem of a complete closeout of such work in the event there is a disarmament program, or in the event there is some agreement not to use space in armaments. I am one who hopes that some day we might reach a point where we could agree not to use nuclear energy and not to use space as weapons of war. Would you share that idea?

Dr. RAMO. Yes. And I think if you have the two separate departments, which I believe is sound and necessary now for the best exploitation of both the peacetime and the military needs, presumably you would be stopping a good deal of work and transferring other work from the Defense Department to NASA in the event of a major disarmament period.

The CHAIRMAN. Do you think it would cause complete disruption?

Dr. RAMO. It would cause some disruption. But on the other hand, we don't have that disarmament period now, and the organization today has to cater, first, to the problem of the moment.

The CHAIRMAN. What would you think of this: Give NASA the basic research program, because this must be done to meet the needs of war or peacetime, and also give to NASA the peacetime utilization of space; but the field of development of weapons to be reserved to the military.

Dr. RAMO. In principle, this, I think, may have been the intention in the original NACA on aerodynamics, yet it turned out to be unrealistic for all research to be in NACA.

The CHAIRMAN. NACA did a grand job.

Dr. RAMO. It did a grand job, but note we had a Defense Department also sponsoring research and development. I think the combination of the two gave us the best possible position for survival.

The CHAIRMAN. That is all right if you can afford the luxury of two or three programs going on at the same time.

Dr. RAMO. But in basic research, that kind of duplication is not a luxury. That is the kind of duplication in which you get something back for each expenditure. To have two researchers pursuing different approaches on a basic research nature problem—this is something we have too little of already in the Nation.

The CHAIRMAN. Your suggestion of two research programs is not exactly correct, it seems to me, because every agency of Government has a basic research program now. The Agriculture Department has a program, the Department of Health, Education, and Welfare has such a program, they all have. So you don't have one or two, you have a multiplicity of programs at this time.

Mr. RAMO. Since we, in my opinion, do not do enough basic research in the United States, and since you do have organizational

problems that are severe, you should not attempt to divest away from an agency that has a clear responsibility the research that they would be picking out from their direct experience as most pertinent to give them what they need. I would say here we can afford some looseness and some duplication, and should not be concerned very greatly with it.

The CHAIRMAN. Mr. Fulton?

Mr. MCDONOUGH. Mr. Fulton has gone. [Laughter.]

I will take his time.

The CHAIRMAN. Mr. McDonough.

Mr. MCDONOUGH. Dr. Ramo, you say that we don't have enough basic research in the United States. Don't we have more basic research in the broad scientific front on medicine, chemistry, physics, aerodynamics, outer space exploration, and so forth, than any other nation in the world?

Dr. RAMO. I don't believe that I can say with certainty that we do or do not, because I really don't have enough confidence in all of my information about what the Russians are doing.

Mr. MCDONOUGH. Let me help you to this extent: If we don't have, then we certainly have a certain amount—we have a great abundance of practical know-how, because we are further advanced in our communications, our transportation, our biological research—I mean in the implementation of these things. Certainly these must come from basic research, and it has been my opinion—and I am trying to get a confirmation of it—that we are superior on the broad scientific field than any other nation in the world.

Dr. RAMO. We probably have been in the past, and this is what has led to our superiority, generally speaking, in the applications of technology.

Perhaps in the last few years, in addition to those things that have come out clearly, the Soviet basic research program may even exceed ours by now.

Mr. MCDONOUGH. Well, they are spectacular, of course, they use the spectacular to impress the public. On the other hand, we are operating as a democracy. We have certain hindrances or duplications and problems that are involved in democracy that are not present in an autocracy or dictatorship. For that reason we appear to be moving slower, but in my candid opinion I don't think we are.

Dr. RAMO. Well, that may very well be, and perhaps I should say that the best guess I can make today does confirm yours, that we are still somewhat ahead in basic research, but compared with the possibilities, the need, the rapidly changing world, the impact of science and technology on our way of life, the implications on survival, and the fact that we can do more basic research, we ought to do more, even if we are a little bit ahead, we ought to insure that we are a long way ahead.

Mr. DADDARIO. Will the gentleman yield?

Mr. MCDONOUGH. Yes, I will be glad to yield.

Mr. DADDARIO. You have constantly referred to survival in everything that you have said. What gives you concern about survival? In what areas do you believe we should do more basic research? Do you believe it ought to be in the military area or in the area of peaceful use of outer space?

Dr. RAMO. When I think about basic research as being relatively weak compared with what our possibilities are, I think of it on a very broad spectrum. I think the fact that the Russians happened to prove that they are not a backward nation by conspicuous acts in space has caused us to focus our attention on space. This is somewhat accidental, in a way. Had they come through with a cure for cancer we would probably have a new agency for biomedical research, recognizing that there might even be military implications, biological warfare from a nation that can cure cancer, when we have been stumped by it.

Mr. DADDARIO. There is that possibility.

Dr. RAMO. There is that possibility. They may come through in a few years with a cure for cancer or a breakthrough in controlled thermonuclear reactions, there are so many possibilities. I think of this as a very broad front, and definitely not limited to military and not limited even to space, military or civilian.

Mr. MCDONOUGH. Hasn't the spectacular scientific breakthrough that Russia made in Sputnik I been the thing that has impressed the world with all of the other things that Russia is supposed to have, but evidently don't have?

Didn't sputnik come as a result of their capturing a number of German scientists from the Piedemont establishment after World War II?

Dr. RAMO. I think the sputnik——

Mr. MCDONOUGH. In other words, they haven't given the world any other spectacular demonstration of their scientific endeavors?

Dr. RAMO. It is my impression that if you talk to a broad range of scientists covering almost every field, medical, physiological, metallurgical, chemistry, nuclear physics, and so on, there is increasing feeling expressed from visits, from the class of papers that they have been publishing for the last decade of repeated evidence that Soviet Russia has a massive research program, and while it may be true that they particularly concentrated on space and have done better on the average there than in other fields, and that we are overly impressed with that, and I oftentimes think that we are, we make too much of a two-to-one difference in thrust or something which is not always pertinent to our national position at all; nevertheless, I think it is unwise to draw any conclusion other than that they are using their resources to the fullest and that they are moving at a tremendous rate.

Mr. MCDONOUGH. I agree.

Dr. RAMO. If it is not this year, it is going to be one of these years, if we don't increase our rate.

Mr. MCDONOUGH. But they haven't implemented any other scientific field to any extent to impress the world?

Dr. RAMO. I don't think that is true; I think they have.

The CHAIRMAN. Mr. Miller?

Mr. MILLER. I think that we have now one of the top scientists in this country advising us, a man by the name of Kistiakowsky. I would assume that is Slavic, if not Russian.

Dr. RAMO. Yes, sir.

Mr. MILLER. And that the Russians have, as a matter of fact, in other fields, music, medicine, and everything else——

Dr. RAMO. If they have two or three George Kistiakowsky's, that comes pretty close to giving them a tremendous advantage. He is quite a man.

Mr. MILLER. Isn't this something we have got to worry about, too, Doctor, that they are educating a great number of scientists and engineers, and whereas we may be qualitatively ahead of them, out of their reservoir they will develop the refinements that will cause us to give a great deal of thought to the subject?

Dr. RAMO. I applaud those words.

Mr. MILLER. Thank you.

You spoke a minute ago about having a man who could assist the President doing some of this work, and word came up about another man, Sherman Adams. Hasn't the President inherently got this power to put such a man into his own office right now to do this job, if he chose to do it?

Dr. RAMO. I assume he has.

Mr. MILLER. If he could find the man.

Dr. RAMO. Well, I think that it just must be true that there are many men in the Nation who could be of great aid in such a slot and some of whom must be available. I don't think that the concept hinges upon whether or not a man can be found for it. I think such a man can be found.

Mr. MILLER. Maybe we should not be stumbling around——

Mr. QUIGLEY. Would the gentlemen yield?

Mr. MILLER. Yes.

Mr. QUIGLEY. At $20,000 a year?

Dr. RAMO. Well, I note that there are such people as Kistiakowsky, Glennan, York, who are in comparable high-level government positions. There are men who could earn much more in industry. I think the question of what motivates people is more complicated than salary and that there will be enough people in the field to choose from.

Mr. MILLER. You won't mind if I add the name Rickover into that group?

Dr. RAMO. Oh, yes.

The CHAIRMAN. I would add a number of others, like Von Braun.

Dr. RAMO. I was thinking, of course, of civilians in comparable high-level policymaking jobs.

Mr. MILLER. I am certain that many of the admirals of the Navy would like to consider Admiral Rickover a civilian. [Laughter.]

The CHAIRMAN. Mr. Hechler.

Mr. HECHLER. I think, Dr. Ramo, if we admit that we can't find such a man, we might just as well give up this whole business.

Dr. RAMO. Exactly.

Mr. HECHLER. I think that is a pretty pessimistic outlook. I would like to follow up on some questions Mr. Daddario was asking earlier on your observation concerning duplication of launch vehicles.

The suggested amendments to the act, 309(b), stated "in order to accomplish the most efficient utilization of resources," and so forth, "for the development of each launch vehicle, that shall be assigned by the President to either the Administration or the Department of Defense." Now, in view of the tremendous costs and increasing cost, I think it is senseless to follow the kind of suggestion which you made that we let them both go ahead and then criticize them afterward.

Why can't this man in the President's office make such a decision before they start?

Dr. RAMO. I think there is a misunderstanding as to what I intended to convey. I was addressing myself, at the point when I made that remark, to refute a concept I felt was a negative one, that all launch vehicles should be put in either place. It seems to me large vehicles, like guidance, like making a computation on a piece of paper, in the end are things that each has a great interest in and each will have different ideas, and rightfully so, of what is needed.

Now, we come to the matter of how you decide these things. If each agency ahead of time starts off on launch vehicles that are quite similar and thus they are duplicating and they therefore have to assign a tremendous fraction of the budget assigned to them, there is a temendous lever on each agency head to see if he cannot get the other one to sponsor this one with him, to compromise what he is proposing so they can each have more money. The cost, itself, is a great lever. As a matter of fact, you have a situation very often in organizations in which by telling them that they should do things separately, you find them coming around and wanting to use the other fellow's facility, and the complaint from one is that the other fellow doesn't seem to have time for him even when he wants to use the other man's. You can have both these two extremes at play.

I am concerned that if you particularly spell out 1 of the 50 fields in which there is going to have to be a certain amount of higher level decisionmaking to avoid unnecessary duplication, and you force each one of those through an approval chain, that you end up with delays which in the end are more penalizing than to go ahead and make the decisions and allow a certain amount of duplication. I admit I am guessing that the duplication won't really be in the double creation of expensive launch vehicles of very similar design. The cost is too much for each of them to embark on it. Each will try to get the other to share the cost with him in order to have some of his budget available for other things.

Mr. HECHLER. Everything you have said has confirmed, I think, the necessity for the type of individual who perhaps could be called a Director of Space and Aeronautics, who would be sitting at the elbow of the President, who would be an extension of the President, who would be strengthening the power of the President, and at the same time in a position to make these decisions.

Thank you, Mr. Chairman.

The CHAIRMAN. Any further questions?

(No response.)

The CHAIRMAN. If not, we want to thank you very much, Doctor, for coming here and giving us the benefit of your testimony.

Dr. RAMO. I am very happy to have been here.

The CHAIRMAN. We will adjourn. I want to remind the members that this afternoon we have scheduled a function at 4 p.m. to be held right in this room. We should all be here at that time to meet our guests.

Tomorrow morning at 10 o'clock we will meet——

Mr. SHELDON. Mr. Chairman, that is 9:30, in the Woodrow Wilson Room of the Library of Congress.

The CHAIRMAN. Everybody will have to get up just a little earlier to get to the Library of Congress at 9:30. We will arrange for a sign so that everybody will know where to go. It is very important that the committee be in full attendance at that time.

Mr. McCormack has said that he will be there, and we hope to have Mr. Martin there, too. Mr. Martin told me he hoped to be there, too. I think we ought to have an excellent attendance; it should be an outstanding occasion.

Mr. DADDARIO. Will that be an open meeting tomorrow morning?

The CHAIRMAN. Tomorrow morning there will be an open meeting. It is open to the extent that we are urging members of the press to come, for example. Other interested persons will be welcome to the limit of the capacity of the auditorium.

Mr. MILLER. Mr. Chairman, may I make a little statement?

The CHAIRMAN. Sure.

Mr. MILLER. I want to say, Doctor, that I think one of the greatest achievements we have made is Pioneer V. Had the Russians done this, it would have gotten twice as much space in the American papers, and we would have been talking about it. This is one of the great breakthroughs and milestones.

Dr. RAMO. Thank you very much. I will take that message back to the boys who worked so hard on it, and they will be very much appreciative of your making that statement, I am sure.

The CHAIRMAN. Mr. Mitchell?

Mr. MITCHELL. You are not yet prepared to set a time to take up the Patent Subcommittee report?

The CHAIRMAN. We will take it up next week. I want to say to the members of the committee that I think it is very important that we take this up at an early date. The minds of the members of the subcommittee are sharp now. They see these points clearly. We don't want them to get rusty in the meantime.

Mr. QUIGLEY. On this one you will not have to worry.

Mr. MITCHELL. May I say this off the record?

(Statement off the record.)

The CHAIRMAN. The committee will adjourn until 9:30 tomorrow morning.

(Whereupon, at 11:50 a.m., the committee adjourned, to reconvene at 9:30 a.m., Friday, March 25, 1960, at the Woodrow Wilson Room of the Library of Congress, on another subject.)

TO AMEND THE NATIONAL AERONAUTICS AND SPACE ACT OF 1958

MONDAY, MARCH 28, 1960

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND ASTRONAUTICS,
Washington, D.C.

The committee met at 10 a.m., Hon. Overton Brooks (chairman) presiding.

The CHAIRMAN. The committee will come to order.

We are honored to have as a witness Lt. Gen. James M. Gavin, U.S. Army (retired) former Deputy Chief, Office of Research and Development, U.S. Army.

Before we take General Gavin's testimony, however, I have two matters before me on which I think the committee would like to be informed.

I have a letter here from Senator Young. He says:

May I express the hope that you will be able to attend an informal reception and cocktail party on Thursday evening, March 31, at the South American Room at the Statler Hotel in Washington. The occasion is to honor a few friends, eminent in the fields of missiles and science who have recently had a direct part in the successful space probe project Pioneer V. As you know, Pioneer V is now over a million miles out in space. An unusual feature will be a display of the sister Pioneer V at 7:30 p.m. Scientists from the National Aeronautics and Space Administration will give a brief explanation and demonstration of how Pioneer V operates and what this achievement means to the U.S. space science program.

Signed, "Senator Stephen M. Young."

I have asked Senator Young if it would be all right to designate someone to represent the committee at that function, and he said it would be.

Mr. Moeller is from Ohio; I have not yet talked to Mr. Moeller about this matter, but if there is no objection, since he and Senator Young are both from Ohio, the Chair will designate Mr. Moeller as the person to attend and to represent the committee.

Here is the other matter: It is from Capt. A. E. Krapf, U.S. Navy, Director of U.S. Naval Research Laboratory, Washington, D.C.

He says:

Each year the Navy Research Laboratory holds Sponsor Day and open house to acquaint prominent Government leaders with the facilities and research program at the Laboratory. For this reason we have set up eight demonstrations and a number of exhibits, all of timely interest in a day's program starting at 9 a.m. on the 7th and 12th of April.

We would like to share with you and the House Science and Astronautics Committee some of our enthusiasm for our work and to give you a sampling of the Navy Research Laboratory's activity in scientific military research.

The enclosed program describes briefly the individual demonstrations. It would be appreciated if this invitation be extended to other members of the

committee. A number of acceptance forms for those members who might plan to come are enclosed. I hope that your schedule will permit your attendance and that of the other members of the committee.

I am delighted if you could accept this invitation and thus receive a firsthand report of what our Naval Research Laboratory is doing for our future Navy and for our country.

I am sure there is no objection. We have a committee meeting scheduled for the 7th, but we have nothing scheduled for the 12th. It seems to me it would be a wise thing for the members of the committee to attend. The Navy is anxious to have us, and it should be an excellent demonstration. Certainly, it is within the immediate province of the work of the committee.

Mr. FULTON. Mr. Chairman, so that the majority leader might hear it, would you repeat it again?

The CHAIRMAN. Well, all right.

Briefly, though, and off the record.

(Discussion off the record.)

The CHAIRMAN. This morning we have Lt. Gen. James M. Gavin, retired, former Deputy Chief, Office of Research and Development.

General Gavin is now from Boston, Mass. We have had him before our committee before, and we are delighted to have him again. He is an eminent witness.

General GAVIN. Thank you, sir.

The CHAIRMAN. If you will proceed with your prepared statement, we would appreciate it.

STATEMENT OF LT. GEN. JAMES M. GAVIN, U.S. ARMY (RETIRED), FORMER DEPUTY CHIEF, OFFICE OF RESEARCH AND DEVELOPMENT

General GAVIN. First, I would like to say how pleased I am to have this opportunity to appear before this committee again. I believe it was 2 years ago when I was last with you.

The CHAIRMAN. I think you were before the select committee at that time.

General GAVIN. Yes, sir; I believe I was.

The CHAIRMAN. Mr. McCormack was chairman.

General GAVIN. Yes; he was.

Few things are more important to our country, and in fact to the Western World today than a well-administered, adequately supported space program. It has been most reassuring to me to have seen the increased support given our space program during the past year.

The Administrator of the National Aeronautics and Space Administration, Dr. Keith Glennan, has been doing a splendid job and if given adequate support, he will, unquestionably, in my opinion, close any gap that now may exist between our own program and that of the Soviets.

The purpose of my being here, as I understand it, is to testify on the proposed bill amending the National Aeronautics and Space Act of 1958, H.R. 9675. I have personal views on the act and I am pleased to have the opportunity to present them.

In doing so, however, I would like to express the view that the administration of the act, in my opinion from long service in Wash-

ington, usually will reflect the methods and manner and let us also say "enthusiasm" of doing business of the Administrator.

Dr. Glennan has been doing an exceptionally fine job within the framework of the provisions of the National Aeronautics and Space Act of 1958. His recommendations for change, therefore, must be given our most serious consideration. I have no doubt that, with the changes made as he suggests, he will continue to carry on as successfully as he has in the past and, undoubtedly with those changes, more successfully. Nevertheless, since I have been asked to present my personal views, I am doing so, not in any sense as a criticism of the present administration, but in an effort to strengthen our administration of our national space programs in the future. In doing so, I would like to comment briefly on specific points.

The first point that I would like to discuss is quite fundamental and it has to do with military and nonmilitary space activities. I realize that the proposed bill is intended to see that—and I quote from Dr. Glennan's letter to this committee, "responsibility for planning and directing nonmilitary space activities is placed directly and unequivocally in one agency, NASA."

Now, I agree entirely with this and that this is what we should seek to do; assign responsibility for planning and directing to one agency. I am of the view, however, that there is but one space program and that one cannot physically separate the nonmilitary and the military space activities. In this respect our space endeavors parallel closely those in our atomic programs. We must have one overall space agency adequately supported from which we will take for military application all the technical information that appears to have military usefulness.

I should add that there only is this aspect of the space program that is in common with our atomic program.

A great deal of discussion about setting up a "Manhattan" type project for space you will recall several years ago—this was really impracticable because our space programs had, in fact, already begun and contributions were being made to our space programs by hundreds of industries scattered throughout the country, our atomic program, however, began from an idea, and all the work could be initially isolated from all over the land and one just couldn't really pull them together as we did with our space program which began in the Department of Defense and only because of failures in judgment and decisionmaking did it become necessary to establish NASA.

Since there is now a "military" program in being and also a "nonmilitary," which is what we like to refer to as program under NASA, the assumption seems to be that these should be continued in this manner. Actually, except for what is essentially product improvement, and sufficient research to make product improvement possible, little progress will be made in the Pentagon without drawing upon the technology, materials and systems and ideas that come out of the NASA program in the future.

In the foreseeable future, if in fact it is not partially true today, the frontier of knowledge will be pushed back by NASA's funding and endeavors almost exclusively. It is important, therefore, that NASA be given the full responsibility for our space program and that its efforts be so organized as to enable it to provide whatever is

necessary for our military program from its own research and development work.

I would certainly not recommend considering two programs. This will surely mean continued duplication and lack of coordination. Furthermore—and this point disturbs me because of my past experience in the Department of Defense, if the decisionmaking process in the Pentagon continues under the present JCS system, and I am not here to discuss the Joint Chiefs of Staff or be critical of them, but I have to make an observation of the decisionmaking process in the Pentagon. If they continue as they have in the past, it seems reasonable to assume that some essential military programs will be held back—this certainly was our experience 4 or 5 years ago—programs that otherwise would be aggressively advanced under the sponsorship of NASA and could be.

Now, next the National Aeronautics and Space Council.

I agree entirely with the elimination of the National Aeronautics and Space Council. One can understand why it was established, looking back upon the hectic days immediate post-Sputnik I period. However, I do not believe that its composition was such as to enable it to contribute a very great deal to the efforts of NASA anyway. I do think that the Administrator of NASA should have available to him the advice of the best council that can be obtained. The Administrator of NASA is charged with the expenditure of funds, the planning and administration of a sizable amount of money.

I think that it would be in the interest of the Administrator of NASA, Congress, and the country as a whole, to provide a council consisting of our most able men who are technically well informed in matters concerning NASA.

I would like to point out in business practice in industry a board of directors normally is available to open management to serve a somewhat similar function. To refer again to the AEC experience, I think that the Commissioners also fill an advisory function that is most helpful, and it is a degree of protection too for our taxpayers, for Congress and for the Administrator himself.

Now, I would like to say that I have learned that a witness before this committee has recommended the establishment of what was referred to as an Aero-Space Coordination Board. From what I know of that recommendation, I have not read it in detail, but I understand in general what it is and who the cochairmen are to be. This, I think, is very sound and this I would agree with entirely, but surely we need a board of this type.

I understand reluctance to appoint more boards on the boards we already have in Washington, but this is really a necessary liaison function that must be performed if my idea of one well-supported program is sound.

Now, if my observations on the need for one overall, well supported space program are valid, then I believe that there is a need for a civilian-military liaison office. This should be established to assure the smooth flow of scientific and technical information from NASA to the Department of Defense. A comparable office has existed between the AEC and the Department of Defense and it has been most successful.

I hesitate to make such references to the AEC, both in numbers and in substance because it is only in these peculiar areas that the relationship is sound in my opinion. The AEC isn't NASA; it has a different problem entirely to deal with, only in the functional sense in the need for liaison, do I think that the reference is valid.

We must have active, imaginative, aggressive liaison between NASA and the Department of Defense, the type board that looks for ideas, searches for ideas and wants to see things applied, and could be helpful to both groups.

Now, briefly, I would like to refer to the patent law and say that I have discussed this with industry upon their request at various times during the past 2 years. The present law clearly acts to discourage industry from working for NASA, and it should be changed. I agree with the changes in the proposed law.

Next, I believe that it would be well to consider carefully and to discuss thoroughly the problem of inhouse work. When the AEC was established, it was anticipated that the technical information coming from the fundamental and applied research of the AEC would be made available to the American industry. This seemed to be a very sound approach to the problem because of the very great cost of undertaking research and development in fundamental nuclear physics.

Our experience to date suggests that while there has been some flow of information, there has been a lot less than American industry has anticipated.

I believe most industrialists associated with the application of nuclear physics to industrial problems would testify exactly like this before this committee. There is a strong feeling on the part of some industries that inhouse work has continued to grow and expand far beyond that anticipated when the AEC was established.

There is a fundamental problem here—that of whether or not we can meet the challenges of the space age through the free-enterprise system or whether or not we must rely upon Government research and development and the production of all the materials and systems that will go into an adequate space program from Government support. If we are to support the free-enterprise system, then a consistent and clear effort must be made to place contracts with industry for research, development, and production. It is realized that sufficient inhouse research must be done to provide yardsticks to the Government that will be used to measure the adequacy of nongovernmental work—this I could illustrate by examples but this should be the limit of inhouse work, in my opinion. The objectives should be to maximize the amount of work placed with industry. I think this is a very fundamental point. We are concerned now with the apparent success of the Soviet economic system, their capacity to maximize their concentration of human, material, intellectual resources on their Government-sponsored programs, denying their people consumer products much as we have in order that they may do this. We must make up our minds that we are going to have a Government program to meet this Government program or we are going to have a program that truly reflects all the imagination, aggressiveness, of the free-enterprise system.

There is another aspect of this that interests me very much. We are concerned about the adequacy of our economy to support a space program. I spent the last year or two doing a great deal of personal background reading on this subject, talking to our Congressmen and technologists about it. I am convinced that we will only have a true space age when we realize that our entire economy reflects the technology of the space age and consumer products, much of which will come out of our space age programs. They will number thousands in time. They will have a tremendous impact on our overall standards of living. From these consumer products will come ideas that can in turn be applied to our space age technology. This regenerative process can be continued to the betterment of both programs and through its continuance we will be able to develop an economy that will in turn be able to support an adequate space program.

To follow the Soviet system of doing all work in Government facilities at a maximum concentration on nonconsumer technology would in my opinion be very shortsighted indeed.

In fact, as one studies our work of the past 5 years in space, one speculates about the American economy and where we are going in space with these very burdensome problems, one wonders what the answer really is to finding adequate support; at the same time, maintaining a healthy, dynamic, growing economy.

Now, I am convinced from my own study of this problem, and that study consists of extensive reading and discussion with our scientists, our industrialists, and our economists, that we really have a position of advantage if we will only realize what it is in this country, and that is to make available to a free enterprise system, to American industry, to the American economy, all of the ideas that can be brought out of our missile and space technology, whether for military or nonmilitary doesn't matter.

Already we have discovered from hydrazine, for example, a drug to treat mental illness. The Office of Naval Research has found a way to lower the body temperature in 10 minutes, which took 90 minutes before, prior to open heart surgery.

We have discovered a valve that may be used in the heart. You can hardly pick up a technical paper today without finding many things that have immediate application to the American economy. Are we going to realize now that this is in fact the space age as we should have realized 56 years ago at Kitty Hawk that we were on the threshhold of the air age, and make this a great space age nation with great space age economy or not?

If we are, then this means a maximum amount of our industrial placement with industry, where maximum conversion can be made to nonmilitary application of technology.

Then out of this nonmilitary application, in a regenerative sense will come ideas, improvements, new ways of doing things that can go back into our space programs. This is exactly the way we have exploited the air age, the nuclear age, and similar periods of man's experience in the past.

I could end on a somewhat poetical note and say that man's endeavors in the past have been identified with his ability to exploit the resources of the Earth and convert them to useful purposes; i.e., the stone age man, the bronze age man, the iron age man. What is this

age going to identify man as? I don't know, but I hope it identifies the United States as a great space age nation, and it can be so identified if it realizes the full significance of the space age. It is more than just a narrow military program and more than just going to the Moon or some place else.

This is the whole economy involved in this thing.

Thank you, sir. That concludes my prepared statement.

The CHAIRMAN. Thank you, General Gavin, for a very fine statement.

I did a lot of thinking while you were making your stimulating statement. I am sure that what you had to say has had the same effect on the other members of the committee.

You stated that a true space age will only be realized when our entire economy reflects the technology of the space age.

I assume that you don't mean, however, that we are going to have to build up our entire economy in order to develop some of the space techniques that we need to develop in order to overcome Russia, do you?

General GAVIN. Sir, I am not sure I follow your question exactly.

The CHAIRMAN. I am trying to find out if you feel that first we have to educate the public and begin the manufacture of space articles and then stimulate the desire on the part of the people of the United States to purchase these space age articles before we can get on with our space program to meet the threat of Russia?

General GAVIN. Yes.

Well, let me say this about that, if I may, sir: There has been a great deal of talk about the missile gap. I had something to do with the authorship of that expression some 6 years ago, and it has been used in many ways.

Mr. MCCORMACK. Can you speak a little louder?

General GAVIN. It has been used in many ways. I think the thing that personally disturbs me more now is what I would call the appreciation gap, the understanding gap. We don't understand the meaning of the space age. We think of it as who gets to the Moon first, or who gets to Mars first with an instrumented package or some such thing as that.

These are just milestones on the way to a new world for man to live in, a new start of living. When we speak of space age, education in space age materials and articles, certainly it begins with education, and we certainly have come a long way in the last 2 years.

I have four children in school and they talk about space all the time and take it quite for granted. They are ready to go to the Moon any time. Our youngsters are coming along very fast. I think we have improved the science education standards significantly in the last 2 years.

We have come a long way. There is still a long way to go. As for space age articles, I refer particularly to materials and systems that come out of space age. I have used examples of things that would be helpful to the human body.

There are hundreds of examples that have come out of this. For example, as we seek to go into space, we explore the temperature spectrum, very, very low and very, very high. The cryogenics area, the pyrogenics area; out of cryogenics research has come the cryotron, a

device that will, when put in computers, give you a condition of superconductivity. I want to avoid technical language, but this means much smaller size computers, much more efficient computers, this means a higher degree of automation; this related to whether things will have tremendous impact on American industry.

The CHAIRMAN. Let me ask you there——

General GAVIN. Yes, sir.

The CHAIRMAN. I don't want to consume too much time, that is the reason I am interrupting at this point. You feel then that we must proceed with the education of our people first.

General GAVIN. Yes.

The CHAIRMAN. But as far as your own family is concerned, you have already done a job of educating them or at least somebody has.

General GAVIN. I hope I have.

The CHAIRMAN. Yes. I think the young people are way ahead of us, too.

General GAVIN. I suspect they are.

The CHAIRMAN. Older people also require education on the possibilities of the space age, so you would recommend that we first proceed to educate the people of the United States. You feel that with proper education, the American people will go ahead with the space program.

General GAVIN. Yes, sir, absolutely.

The CHAIRMAN. In the meantime, do you feel that Russia would pose a threat to this country by its development of military weapons while we go ahead with the education of our people?

General GAVIN. Well, they are a constant threat. By their own declaration they are at war with us now. Mr. Khrushchev has stated this very thing. I refer to the expression "I declare war on you in the realm of trade." This is as much war as hardware and bullets once was. In the area of technology, in psychology, the wars of today are being decided.

The CHAIRMAN. Do you think we have time to wait for our people to be educated fully?

General GAVIN. Yes.

The CHAIRMAN. On the desirability of the space age and its end products? Do you think we have that time while Russia poses a threat to the very existence of our people?

General GAVIN. Oh, yes, sir, I think this is fundamental to the working of our democracy. The people must understand. As you say, the young people do. Yet every week we get letters from housewives: "Why go to the Moon? We have enough problems on Earth. Why spend money on this and that? People don't realize this is a whole new world we are entering.

The CHAIRMAN. I would like to get your answer to that question so I could use it, myself.

General GAVIN. Well, sir I finally wrote up a piece about three pages long that I have had reproduced, and I just send that off with a little note. I will send you a copy.

Mr. HECHLER. Can we get that for the record, that three-page document?

Mr. FULTON. Ask for unanimous consent.

The CHAIRMAN. I don't think there would be objection, unless the General objects to putting it in the record.

(The information referred to follows:)

WHY BE INTERESTED IN THE SPACE AGE?

The question most frequently asked of those concerned with urging more interest in the national space program is, "Who wants to go to the Moon, and what for?" There are many variations of this, "Why go to Mars?" "We have enough problems here on Earth that we haven't solved, why go someplace else looking for more?" "Why have a race for space for anyone, why don't we all try to get along better here?" The answers to these questions are far from simple, but they do deserve answers. In attempting to answer them, however, it is well that we take a look at space itself. It is necessary that we do this since preoccupation with himself and his own environment is quite fundamental to many of man's shortcomings. He meets with difficulty when he tries to place himself in an environmental spectrum in the universe and understand his own position in relationship to others.

As planets go, the Earth is quite young. Mars is millions of years older and the Moon is probably older than the Earth although it is a satellite of our own planet. Venus is probably younger. Within the past few weeks we had a good look at Venus and found that there was considerable moisture in the gaseous envelope that encloses it. Some astrophysicists such as Dr. Whipple think that Venus is entirely water. This is because of the heavy carbon dioxide content of its atmosphere. If it is mostly water, this might be useful to space travelers, although we are not sure that it is yet. Mars, on the other hand, appears to be extremely dry and denuded of any advanced forms of vegetation although chlorophyll is present in the opinion of Soviet scientists and therefore some forms of vegetable matter, living matter, are present. It has giant polar snowcaps and an equatorial region that changes with the seasons. It also has two satellites revolving about it that are, interestingly enough, named "Fear" and "Terror." These are earthmen names. We don't know what happened to Mars in its history, but there is considerable scientific opinion in the U.S.S.R. to support the theory that the satellites are artificial hollow bodies. This is interesting since "Fear" and "Terror" are in the order of 16 kilometers and 8 kilometers in diameter. There is also a school of thought that holds that Mars was once populated by superior, intelligent people, but that they lost control of their own environment. Apparently, giant canals were dug to provide water from the polar regions for the equatorial belt at one time in the history of Mars, although in saying this I realize that there are other theories for what appear to be canals. But, something had to be done to provide for a rapid transfer of the water since the ice is not very thick, in general most of it a few inches, and since there is no rainfall to speak of on Mars.

There are a number of other interesting phenomena of which we are aware. Among these, for example, is what evidently was a nuclear explosion over what was Siberia in 1908. Was this a device or nuclear spacecraft launched from another planet, from the solar system or from outside the solar system? No one knows and any views now must of necessity be highly speculative. What all of this amounts to is that there is a great deal that we don't know about the universe and just a little bit that we do. What we do know is like comparing a drop of water to the entire ocean. It would be interesting to know enough about it in order to know where Earth fits into the history of the universe, past, present, or future, and the future is the most important. Where are we going to be and where is the Earth going to be 100,000 years from now? The answers to the latter questions will depend upon how rapidly we acquire knowledge of ourselves and the universe in which we live. Next, how rapidly we apply this knowledge to the betterment of mankind and the environment in which he lives. Now, as it happens two systems of managing the affairs of men have been established on Earth; we have a bipolar system. In general one is a free enterprise system about which polarizes most of the free world, and the other is a form of state capitalism in which humanity and the Earth's resources available to them are exploited by a dictatorship. About this latter polar center, gravitates all of the satellites of the U.S.S.R. We, therefore, live in a bipolar existence in which it appears that one, by their own declaration the U.S.S.R., may seek to dominate the other to its enslavement and constant misery.

If the free world is to survive and remain free, therefore, it is necessary that we understand the meaning of space and our place in the space age.

The nation that first acquires knowledge of the many things that will establish it well as a space age nation will do very well indeed for all those nations

associated with it. As we penetrate deeper into the Earth and explore farther for resources with which to explore space, we explore the temperature spectrum of materials, and the high pressure and low vacuum area of processing materials. This exploration of the physical earth, and our research laboratory studies, will lead to a number of things to better the lot of mankind. Already, we have found a drug developed from a missile propellant to treat mental ills, a means of rapidly lowering blood temperature in an operation, a heart valve that may replace a valve in the human heart. We have learned about materials of which man had never dreamed before that would perform many useful services.

Man has identified his past endeavors in terms of his control of the Earth's resources. For example, the stone age, the bronze age, the iron age. In the space age he well may label his efforts, with the passage of time, as the age of exotic alloys or the age of plastics or ceramics, or cermets. And, as man learns about all of these new materials and things that can be done with them, he slowly acquires a capability to escape from his captive environment upon the Earth. In doing so he will learn how weather is formed, and perhaps how to control it. He will learn how to establish a worldwide communications network that will enable all men everywhere to communicate with each other with much greater efficiency and much less expense than it does now. This communication will include, for example, TV programs, as well as messages. He will learn much more about the Earth and learn to navigate upon it with great accuracy, and finally, he will learn much about the solar system and about the other systems beyond the solar system. And, at this stage, if its programs have been brought along properly, he should be able to make available to a group such as the United Nations the means for keeping the Earth under constant surveillance and thus he should, for the first time in the history of earthman, have a capability of establishing and maintaining peace on Earth. But, most important, all of this knowledge should be converted to the peaceful and useful purposes of humanity. This is what we should seek to do. If, incidental to this overall space program, we first land on the Moon, or make the first trip to Mars, these should be considered but milestones of progress. They are not the most important things. Likewise, firing an intercontinental missile in test is only evidence of a state of technology of the nation that achieves this capability. There are many more milestones that must be passed in man's penetration of space, as he seeks to force back the frontier of knowledge.

Finally, fundamental to our survival, to the free enterprise system in the West, is a free economy. In the years that lie ahead only the space age economy will in fact be a sound economy. Only an economy that is highly energized, imaginative and farseeing, can serve the needs of free men in the decade that lies ahead. An economy such as this must be based upon an imaginative, aggressive space age program.

ARTHUR D. LITTLE, INC.,
JAMES M. GAVIN,
Lieutenant General, USA (Retired).

Mr. MCCORMACK. Will the Chair yield?

The CHAIRMAN. I will yield.

Mr. MCCORMACK. Maybe there is not a meeting of the minds. I would like the general to enlighten me. He and I have had lunch several times and have been able to explore this on a personal level.

You are not advocating that we just educate first and then forget the research work and the doing of the things we have to do for survival?

General GAVIN. No, no, no. I would hope this educational program would go on and parallel a very aggressive technical program pursued as fast as we can push it. A research program, and at the same time, expand and encourage interest in education in what this means to us.

The CHAIRMAN. I think that is correct, parallel approaches, pushing both together.

Mr. MCCORMACK. General, you say you agree entirely with the elimination of the National Aeronautics and Space Council?

General GAVIN. Yes, sir, I do.

Mr. McCORMACK. But as far as NASA is concerned, you think there should be created another council?

General GAVIN. I think so, yes.

Mr. McCORMACK. That would confine itself to NASA?

General GAVIN. I beg pardon, sir?

Mr. McCORMACK. Confined to NASA?

General GAVIN. Yes, confined to NASA.

Mr. McCORMACK. What kind of a council would you recommend in that case?

General GAVIN. Well, it should be something comparable to what, in industry, may be a board of directors. It should therefore consist of the best technical people that we can bring in. May I use names? For example, people like Dr. DuBridge, Dr. Van Allen, Dr. Whipple, it should be a mixture of theoretical astrophysicists and industrialists.

Mr. McCORMACK. Should that council be created by law or by administrative action?

General GAVIN. In my personal opinion it would be well to do it by Executive order; just by administrative process, if this could be done.

Mr. McCORMACK. In other words, you are not recommending that any amendments that this committee might recommend provide specifically for the establishment of what might be called a supercouncil within NASA?

General GAVIN. Yes, that is right. If it could be done outside of the specific wording of this law, I would like to see it done that way.

Mr. McCORMACK. You say all basic research should be done in NASA, is that the substance of your testimony?

General GAVIN. Yes, sir. I have made some modification to this in this way: NASA should have responsibility for our national space program. Out of that space program will come something for the Department of Commerce, for example, things such as weather control. Other things, such as communications systems will go to another department, Defense. I might say I find it difficult to conceive of much, as we now understand space, that is to be learned about space that does not have immediate military application. I think we have really failed to appreciate the military significance of space.

Mr. McCORMACK. I direct my question more from the military angle and the question of survival in the world of today.

General GAVIN. Therefore NASA should get the fullest amount of support. Now, if the Department of Defense is to improve what it now has, it will do a certain amount of basic research. It is doing it now.

Mr. McCORMACK. Should they continue?

General GAVIN. Materials research, and so on.

Mr. McCORMACK. But should they continue?

General GAVIN. Yes, I say they should be given sufficient funding and they will come before the appropriate committees and ask for it, to enable them to improve the military systems they have in being and in prospect, things that are not being duplicated by NASA.

Mr. McCORMACK. Well, the question which occurs to me has to do with human operations, the question of decision and action. Now, do you agree that the uppermost thought in the American people's

minds should be the question of survival, not only for ourselves, but these youngsters coming along? The kind of life they are going to live is being decided today, isn't it?

General GAVIN. Yes, sir, sure.

Mr. MCCORMACK. We cannot downgrade doing those things that will go to the survival of our Nation.

General GAVIN. Absolutely not.

Mr. MCCORMACK. Suppose there is a mission which the military has decided upon, do you think that the research connected with that mission should be given to NASA?

General GAVIN. Well, sir, I hope I have time to develop this point this morning. I think it is very important. I was associated in the Pentagon with the development of a number of our, shall we say, innovations, tactical nuclear weapons, on which I did a paper in 1949, I guess.

I found that only because of people in the AEC, Dr. York, who is now over in the Pentagon, working at Livermore, and others, who had the ability, the willingness, the imagination, and the funding to get along with those programs did the programs move ahead. When they were in the Department of Defense I found myself checkmated in interservice problems in the Joint Chiefs of Staff. Programs were not allowed to go ahead for reasons that seemed adequate to the Pentagon to hold them back—perhaps sound professional judgment that they were not right, they were held back. I have found this in the development, for example, of vertical take-off aircraft, which was a pretty sad story, but there it is.

Incidentally, I have also found the same thing in the missile program in 1955, 1956, and so on.

Now, I can conceive of a number of things being apparent to NASA that could be done. One could put a man aboard a vehicle in space, one could use that vehicle to clear satellites out of space. One could use that vehicle to deny access to space on the part of another country.

Mr. MCCORMACK. I wasn't discussing that. I was wondering if you would put all basic research in NASA, whether connected with peacetime purposes or military purposes.

General GAVIN. If this sort of program went into the Department of Defense it is highly likely that it, or parts of it, would get into the interservice differences of view, arguments as to which service should handle it, and it will come back, and this bothers me very much.

Mr. MCCORMACK. That comes into the question of human action operating within the Department of Defense.

General GAVIN. That is correct, that is correct.

Mr. MCCORMACK. But my question is, I think more fundamental. I would like to get your views. Do you say that all basic research, both for peacetime and military purposes, should be put in NASA?

General GAVIN. No, sir. I tried to explain that a moment ago. Part of it will have to be in Department of Defense.

Mr. MCCORMACK. In other words, if you put it all in NASA, then NASA would dominate Defense on military research; wouldn't it?

General GAVIN. Sir, if they do it as well as the AEC developed nuclear weapons, we would be a lot better off than if we put it in the Department of Defense.

Mr. McCORMACK. Dealing with nuclear weapons, you are dealing with a product, commodity, highly important. In the other you are dealing with a tremendous area of space.

General GAVIN. Yes, yes. Of course, but many things come out of our nuclear programs, isotopes for industrial practice, agriculture, medical practice, propulsion systems for sea craft, perhaps for land vehicles in time, perhaps for air vehicles. And fusion power, as well as reactors, fission power, many things have come out of that that were furthered aggressively by the AEC. I only speak from experience in the realities of life today in Washington, and I can see very important things being held back in the Pentagon while we seek to adjudicate roles and missions, settle arguments, and disputes and, sir, we have got to go ahead in this space program.

We can't stand for any such thing holding us back. We have to go as fast as we can go.

Mr. McCORMACK. This committee realizes that. We realize that, not only this committee, but the select committee, and our reports show it. But what I wanted was to find out from you—you have now said that you don't believe that all basic research involving the military should be in NASA, that it would not be wise at this time.

General GAVIN. That is right, that is right, sir.

Mr. McCORMACK. At this time in the world's history.

General GAVIN. Yes.

Mr. McCORMACK. Later it might be a different proposition?

General GAVIN. I think it will change, yes.

Mr. McCORMACK. That is all.

The CHAIRMAN. Mr. Fulton.

Mr. FULTON. Glad to have you here, General.

I recall your enthusiasm when you appeared before the select committee, of which I was a member, and which was under the chairmanship of our present member, the majority leader, Mr. McCormack, of Massachusetts. You came—I believe it was April 7, Tuesday afternoon, 1958. Also on that morning General Medaris appeared representing the Army Ballistic Missile Agency.

General GAVIN. That is right, yes, sir.

Mr. FULTON. As a matter of fact, you made quite an impression on us that day. I class you as one of the two eager beavers in space. I guess I am in the group on one of the minor stars. Mr. McCormack was one who advanced the idea that space should be placed at an important part in Government, and so did you.

General GAVIN. Yes, sir.

Mr. FULTON. And you are to be complimented on it.

The question comes up in a difficult time, when we can see that the space program is more than just missiles. For example, before the Johnson committee—and I believe you appeared there on December 13, 1957—questions had been asked: What is more important, a missile program or a space program? Then the afternoon that you appeared before us you repeated to us that the missile program was within the space program, but that the space program was much more, and more important to us, and therefore we should strike out boldly in order to get this room for research and development that did not seem to be possible when the military had to justify weaponry systems through a budget.

I thought that had a lot to it, and I still do, and my question then would be more or less to repeat what came up that afternoon: You still think that the space program should be a broad, far-reaching and bold program, and in the nature, maybe, of Teddy Roosevelt, when he said "Speak softly and carry a big stick." I don't want it in the context with just Russia, because I think this is bigger. We should have a program that is a broad, long-range program, based on progress, and not simply on the current missile proportion that might exist between Russia and the United States.

To me, it is too small an area of reference or judgment to base the moving into the missile program by the United States upon whether we are going to be ahead or behind Russia at a certain point in time; for example, now, a month or 2 years from now.

Don't you agree that the most important thing is the space program, not just the missile program?

General GAVIN. Oh, yes, sir, I agree entirely with that. I think I find myself in complete agreement with you.

Mr. FULTON. The surprising thing is now that I have become better educated on this subject I have gone back and checked your statements and I find that I am in complete agreement with your statements then and now, although I was a very inquiring questioner at the time, if you recall.

General GAVIN. Yes, sir.

Mr. FULTON. In fact, I like your statement so well today I am going to put it in the Congressional Record, and I would like to join with Mr. Hechler in asking unanimous consent of the chairman that your replies to the people who are writing to you also be put in the record.

Mr. Hechler, will you join me with that?

The CHAIRMAN. You don't need unanimous consent of the committee. If you want to put it in the record it is your privilege.

Mr. FULTON. Another thing that is always coming up in a presidential year is: Who is to blame for this? From your testimony in 1958, I concluded the scientists were partly to blame because they didn't have the vision in 1945, 1946, 1947, and 1948, and weren't looking ahead enough and were a little more timid than bold.

Secondly, I think the military was partly to blame, because I remember you said that in May 1956, you had received a statement from the Army, "You will not undertake the satellite program using the Redstone or Jupiter missiles." Signed by the Deputy Assistant Secretary of Defense.

By September 20, 1956, you had put a Jupiter-C up 3,300 miles, so you were perfectly capable of doing it, and doing it quite a few months ahead of the Russians.

The next thing is this: Congress is a little to blame, because you weren't given the money. You said that after World War II that we needed a full funding of missile programs through the years 1946, 1947, 1948, 1949, and 1950. I will say we could have put up a satellite a year and a half earlier than we did. I think, too, that until the Von Neumann Committee was appointed in the 1954–55 period by the executive department with the specific go-ahead, that we were again not putting forth our full efforts. So that all those factors, to me, and separate and apart from a political year such as

this, have had a slowing effect on a program that we must now give full punch and go forward with. Don't you agree with that?

General GAVIN. Yes, I would. I would just make one point, sir. That order which I received on May 26, 1956, specifically forbidding me to launch a satellite came from the Department of Defense, signed by the Deputy Assistant Secretary of Defense, not from the Army. In fact, the Army was seeking to launch the satellite.

The CHAIRMAN. Will the gentleman yield? Do you have a copy of that with you?

General GAVIN. I don't have the order with me personally, but I can provide a copy to this committee.

The CHAIRMAN. I think everybody on the committee would be very much interested in a copy of it, at least having it available in the record.

General GAVIN. I shall provide it to the committee, sir.

(The material referred to is classified.)

Mr. FULTON. I really had said it came to you from the Deputy Secretary of Defense, but I felt that it came to you through the Army.

General GAVIN. Yes, sir, it did; it had to come down——

Mr. FULTON. It came to you through the Army channels.

General GAVIN. Yes, sir, correct.

Mr. FULTON. May I finish with this? You, Dr. von Braun, and Secretary of the Army Stevens and General Ridgway were very interested, weren't you, in 1954, in going ahead with these programs in space?

General GAVIN. Yes, sir; we met in the office of Secretary Stevens with a model of a globe and a satellite, and I recall seeking to arouse his interest in it so we could get funding to go ahead with it. Yes, this is so; about 1954 or 1955—about 1955, I guess it was.

Mr. FULTON. It was 1954.

General GAVIN. 1954? Yes, sir; it was 1954, Mr. Stevens was still in office then.

Mr. FULTON. Yes. May I finish by saying this: This is an election year, and you would be surprised, at the number of people who say, "Why just look at the other side of the Moon when we have so many problems?" And I hope that with your intelligence and background, that you will help keep this out of politics in this election year; and secondly, will help sustain publicly the people who are still trying to get the public acceptance and the funds for these programs.

Thank you very much.

General GAVIN. Thank you, sir.

The CHAIRMAN. Mr. Sisk?

Mr. SISK. General Gavin, I, too, have been reviewing some of your statements back a few years ago, and I think your statement this morning is still pretty well in line. This morning you commented on the recommended amendments to H.R. 9675. Now, do you feel that the amendments that are proposed will strengthen NASA and enable it to do a better job?

General GAVIN. Yes, sir; I think they would.

Mr. SISK. Now, on page 2 of your statement, General, you discuss the need for one program, one agency, and you say "I am of the view, however, that there is but one space program, and that one cannot

physically separate the nonmilitary and the military space activities. We must have one overall space agency adequately supported," and so on.

In what way do you think this bill will improve the situation over what we have had for the past 2 years? Do you think that it gets any closer to complying with what you think is required?

General GAVIN. Well, sir, if we allow the present condition to continue of—and I am not in the Pentagon now nor in fact have I physically been in that building for 2 years, except for a brief visit on an academic matter, and I am not sure what the Pentagon's space programs are, but I can foresee duplication and matters arising of needing adjudication, whether or not things should be in the Pentagon or should be under NASA.

Furthermore, what is a defense space program? Does this go so far as to include establishing a small base on the Moon? Does it go so far as to include a probe to Mars, does it go so far as to include developing a capability of sweeping satellites from the sky or putting a man in space on station for a specific scientific research purpose? I think it includes all of these things. We are into a very interesting psychological war with the Soviets, and Mr. Khrushchev always speaks piously of the peaceful purposes of their space program. I think that any well-informed man on scientific military matters realizes that he will achieve a significant and very impressive military capability out of his space program, however peaceful they may now appear to be.

We tend to confuse the words in response, therefore, to the Soviet psychological attack upon us and keep speaking so of our peaceful purposes of our space program. Indeed they are, but surely we must realize that out of all of this will come our very survival, will come defense programs.

Now, I think that the work now being done in NASA should get a fuller support, our fullest support, and then whatever has military application should be applied to the defense programs without delay, much as we have done with our nuclear programs.

In the meantime, since the Department of Defense is well underway, they should get sufficient support to enable them to improve their present capabilities; if this means some basic research, go ahead. But we must recognize that in time the big main thrust will come out of NASA into space.

Now, I can foresee, therefore, in the foreseeable future that much will be accomplished by NASA that could not be accomplished under the present system of thinking that some things are military and must be in the Pentagon for administration and carrying out. Again, as I cited examples before, I can imagine easily things coming up in paper form that the Department of Defense would insist were military, and as I said, most things will have military application sooner or later, and if our experience in the future is, as it has been in the past, because of the present structure of the Department of Defense, there will be delays, committee hearings, failure to go ahead, simply because they cannot agree as to service responsibility or quite how to place it or how it fits into roles and missions. What you are doing here in this act impinges clearly upon the Department of Defense and how you solve it is—you really have a difficult problem before you.

I suggest this solution because I believe it to be sound, based upon my experience in the Department of Defense. I can see leaving the present condition to prevail bringing upon us the same old problems we have had in the past, only compounded and compounded as we get into a more dynamic, faster moving technology, with many, many, many things having military application, all that need resolution in the Department of Defense.

Mr. SISK. What do you consider to be the greatest common denominator between NASA and DOD? Doesn't it come down to one thing, General?

General GAVIN. Do you mean physically, like a booster?

Mr. SISK. Yes, sir.

General GAVIN. Like a booster, you mean a large booster?

Mr. SISK. Yes. In other words, what is the common denominator? To me it actually resolves itself down to one common denominator, and that is the booster vehicle, is that correct?

General GAVIN. That is correct, yes, that is just about right. There will be other vehicles, we will have a vehicle we can put up in space, maintain in space, leave and come back from orbit from time to time. Then there will be many. But as of this moment, getting that big booster into being is the big thing, and that certainly is in common, no question about that.

Mr. SISK. Of course, an attempt to pull these agencies together, and yet at the same time have a single space program, which I understand you to advocate, and with which I agree completely, it seems that if there were some way to give to each agency a specific part of the job and then the wherewithal to do the job, that maybe that might be better than some of this confusion that seemingly exists.

Now, there is a common denominator, there isn't any question but what both military and NASA must have larger and larger boosters.

General GAVIN. Absolutely.

Mr. SISK. Booster vehicles. Now, if we could have only one booster program—I question the advisability of two booster programs. Another example: Why should NASA spend millions upon millions developing a medical laboratory for space medicine, when the military already has an adequate program? Why not depend on that program? I have been hammering away at them about the construction field. Why don't they use the Army Corps of Engineers to do NASA's construction? Those are two things that can be done in the presently existing DOD. Let NASA handle the basic research in many of the other things. Couldn't we physically divide some of these things and still marry them in such way that we could move ahead far faster, avoid a lot of duplication? That is the point of my question.

General GAVIN. Yes.

The CHAIRMAN. The gentleman's time has expired.

Mr. Van Pelt?

Mr. SISK. Could he answer——

Mr. VAN PELT. Let General Gavin answer.

General GAVIN. I think we are in agreement, really; I don't think we are at all far apart. You gentlemen know, I understand, that Secretary Douglas recommended the establishment of an Aerospace Coordinating Activities Board. This would accomplish what I had

in mind, a coordinating board between the Department of Defense and NASA. If I had more familiarity with what defense programs, each one, is now, I would know about where to say: "Yes, let that stay there," but I am perhaps preoccupied with the experience of some years ago in the Pentagon, when our military program simply couldn't get ahead, even though our best astrophysicists knew they should have been advanced. It worries me to think that we might let this condition prevail much longer. I know Dr. Glennan is showing remarkable progress. All I want to do is get all of this information over there as fast as we can and give them adequate support too.

Mr. SISK. Thank you.

Mr. FULTON. Mr. Sisk's suggestion of simply having one research and development agency acting in these fields, it seems to have inherent in it that there should be a narrower base for research and development. I would ask Mr. Sisk: Why have two Houses of Congress working on the same things when one House would be sufficient?

That is all.

The CHAIRMAN. Do you wish to answer that, General Gavin?

General GAVIN. Sir, I don't believe the question was addressed to me. [Laughter.]

The CHAIRMAN. It was addressed to Mr. Van Pelt, I guess.

The CHAIRMAN. Mr. Van Pelt.

Mr. VAN PELT. General Gavin, I certainly concur in the views and your friendly expression with regard to Dr. Keith Glennan.

Going back to page 2 of your statement, you say:

> Our space program began in the Department of Defense and only because of the failures in judgment in decisionmaking did it become necessary to establish NASA—

which gets me back to the point, again, of we are abolishing one committee or one commission and we come up with a recommendation of another one. My question would be this: As far as the Administrator is concerned, and he has so testified, that he calls in the men under him at the various levels for counsel and that they in turn carry on a liaison with the Department of Defense, I would just like to get a further clarification of your views.

General GAVIN. Yes, sir. Well, I said in my—I think on the first page there that the administration reflects the way of doing business of the Administrator, and Dr. Glennan is doing a first-class job, a superb job now. And the way he has recommended that he continue to do it by his changes would improve his present performance. I wouldn't take exception to that, except if you asked my personal opinion I will give it to you, and I have, that he should have a good advisory committee and he should have a liaison group, whether it is a coordinating board or what it is, with the Department of Defense. If he seeks to do it otherwise and he does his job successfully in the future as he has in the past, we will be well off.

Mr. VAN PELT. Don't you feel as he calls in from time to time, and it is quite frequently, I understand, the men in top departments in NASA, that that is a pretty sound Board of Directors?

General GAVIN. Well, sir, now you are getting into a very interesting industrial problem, an inhouse Board and an outside Board. Real strong management always likes to have its inhouse Board. I am inclined to think that it would be better done, managed, be

sounder to bring in outside people, you get more objective judgment. There is a tendency to be a yes man, men in the inhouse Board can't very often disagree with the Board and stay inhouse very long, you know.

An outside Board is better in my personal opinion. This is a fundamental argument in industry, however, that comes in for a great deal of discussion.

Mr. VAN PELT. Of course, we are in a civilian organization rather than the Department of Defense, under military, where these men should be able to speak their minds quite frankly.

General GAVIN. I would say, if you were in a shoe button factory and you call people in and you find one man was rather recalcitrant and didn't agree, he wouldn't stay there very long. I think it would be well to have an outside board.

Mr. VAN PELT. Thank you very much.

The CHAIRMAN. Mr. Wolf?

Mr. WOLF. No questions at this time.

The CHAIRMAN. Mr. Karth?

Mr. KARTH. General, I think the misunderstanding I might have had on your presentation was largely dissipated in your colloquy with Mr. Sisk.

General GAVIN. Yes.

Mr. KARTH. It seems to me you put a great deal of emphasis on the fact that we should treat the space age with a bold, overall space program, and in this I agree. But momentarily perhaps I thought that you were attempting to minimize the importance of the man-in-space program that we are entering into.

General GAVIN. No.

Mr. KARTH. And I am quite satisfied that you are not doing that.

General GAVIN. No. May I say a word on that?

Mr. KARTH. Yes, sir.

General GAVIN. No; absolutely not. Our very survival depends on how well we do in our space program. I might say that, being here, I am a product of this environment of some years back, and I am quite mindful of how things work. I saw the AEC get money in 1948, 1949, and 1950 that enabled it to do tremendous things when the Department of Defense just couldn't get money at all. I would be very worried to see major portions of our space program in DOD; however well intentioned they were, they still couldn't get money, whereas I know that NASA can and very likely will for several years.

The CHAIRMAN. The Department of Defense, first, has to get its budget of $41 billion set up before they could take on additional projects.

General GAVIN. That is right.

Mr. KARTH. One question, gentlemen, that I would like to ask. It does not necessarily deal with this particular committee, although I think the effect of such legislation would be felt by the committee and would have to be dealt with in accordance therewith.

You made quite a point of the fact that we should have this overall responsibility under the NASA to eliminate continued duplication and lack of coordination, in your words on page 3. There is a bill pending before the Congress that would unify the services, for example, with its primary purpose being to eliminate duplication and eliminate lack of coordination.

Would you feel responsive to supporting a piece of legislation like that?

General GAVIN. Sir, I am not familiar in detail with that legislation at all.

Mr. KARTH. What it does is unifies the three services to eliminate lack of coordination, and duplication. Do you feel that would have the same effects as what you proposed?

General GAVIN. Sir, I would have to see that; that gets to be quite a thing.

Mr. KARTH. My last question, General: Do you feel that there is considerable lack of coordination and there is considerable duplication in the military services as they are now composed?

General GAVIN. Within the framework of the law in which they must operate now, I think they are doing very well, and the taxpayers are getting their defense dollar for the dollar they get over there. Inherently in a situation like that, where you have a Joint Chiefs of Staff system and you have the separate services, you have a degree of duplication and perhaps some unnecessary overlapping, and I have testified here on past occasions on what should be done about that, going back to December 1957.

Much can be done, and I think in the last 2 years a great deal has been done. I personally think Mr. Gates is doing a splendid job over there, first-class job, one of the best secretaries we have had in a long time. I don't know the details of the Unification Act to which you refer, sir, but certainly something must be done, because there is overlapping now and duplication.

The CHAIRMAN. Mr. Hechler?

Mr. HECHLER. Along the line of that, that something has to be done, have you seen section 309 of the proposed bill?

General GAVIN. Yes, sir; I have.

Mr. HECHLER. On coordination and cooperation?

General GAVIN. I have a copy of it here with me.

Mr. HECHLER. I agree with you that Dr. Glennan and Secretary Gates have done a very good job, and that they, too, are very deeply interested in coordination. They have both indicated that the Space Council and the CMLC could well be abolished, and they could carry on coordination at all channels.

General GAVIN. Yes.

Mr. HECHLER. And also since they are such good friends, between themselves. But what disturbs me is—you have a wonderful situation here where Dr. Glennan can go up to the Secretary of Defense and say "Greetings, Gates, let's coordinate." The thing is worked out informally. But isn't the prime necessity here the necessity for decision, the necessity for decision above the level of NASA and the Department of Defense?

General GAVIN. Yes.

Mr. HECHLER. Because you can liaise, you can coordinate, you can cooperate all you want, but if you don't have a decision, why then your program is not moved forward with the utmost urgency, isn't that correct?

General GAVIN. Yes; it is really both, you know, sir; both decisions and passing of information. Our experience in nuclear weapons—and I was both associated with that and I think that our program has been

outstanding and well in advance of that of the Soviets for some years; I don't know where it stands today, but what we did with small tactical nuclear weapons packaging is just remarkable. And that came from an exchange of ideas. The people in the AEC would talk to the people in the Pentagon, and they in turn would express requirements, then they would come back—we are doing this, doing that.

Mr. HECHLER. All right. But no matter how much exchange of information you have, if you don't have decision you can't get anywhere.

General GAVIN. You don't get anywhere. I notice that it is provided for the President to arbitrate differences of view and make a decision.

Mr. HECHLER. Obviously, we can't put the burden on the President personally to get into the details of all these decisions. Therefore, wouldn't it make sense to put a man in the White House office who perhaps could be called a Director of Space and Aeronautics, who would be right in the White House office, say, in the east wing like Fred Vinson was, without the necessity of an additional layer or a great staff, but simply an individual who could make the decision in the name of the President, and backed up or vetoed by the President, on such things as assignment of new launch vehicles?

General GAVIN. Yes. Now, as I understand it now, Dr. Kistiakowsky fills a role at least something similar to this as did Dr. Killian.

Mr. HECHLER. He is a scientific adviser. He is not clothed with the kind of authority so he could make the decision.

General GAVIN. Whether or not the President would want that, would certainly be a matter for him to say; I don't know. You touch upon a very interesting problem, whether or not we should in fact have a scientist as a Cabinet member. This is much discussed in scientific circles, and most scientists are against it. Yet, science enters every national decision now.

Now, how this man would act as a representative of the President, I don't know, sir.

Mr. HECHLER. My suggestion would be to make this man above the Cabinet.

General GAVIN. I see.

Mr. HECHLER. A super-Cabinet member.

General GAVIN. I see.

Mr. HECHLER. What do you think about that?

General GAVIN. As you have described it, I think it would be a good idea. But as spelled out in detail, I would like to get another look at it.

Mr. HECHLER. That is all I have.

The CHAIRMAN. Mr. King?

Mr. FULTON. Would you yield, if your time has not expired on that point?

Mr. HECHLER. Gladly.

Mr. FULTON. Do you mean you would favor putting somebody between the Secretary of Defense and the President with power of decision on day-to-day matters?

Mr. HECHLER. No, no, no.

Mr. FULTON. On defense matters?

Mr. HECHLER. No.

Mr. FULTON. Or would you simply continue Kistiakowsky on an advisory situation to the President, as Dr. Killian was? The point of difference that I would like to make plain to Dr. Hechler is: Shall there be a point of decision below the President on all space matters at, say, the White House level and above the Cabinet officers dealing with this particular subject, as distinguished from a scientific adviser to the President?

Mr. HECHLER. If the gentleman will allow me, I am simply suggesting a man who could be an extension of the eyes, ears, arms, and legs of the President, himself.

Mr. FULTON. Yes. I agree.

Mr. HECHLER. Because the President, himself, cannot possibly handle all of these questions with sufficient details. I am not advocating a man who makes the day-to-day and extremely detailed work to interpose himself between the President and the Secretary of Defense.

The CHAIRMAN. Will the gentleman yield?

Mr. HECHLER. Yes.

The CHAIRMAN. What concerns me is this: You are cutting out the Space Council.

Mr. HECHLER. No, I am not, sir—excuse me.

The CHAIRMAN. I am not referring to Dr. Hechler in reference to my conclusions. The Space Council will be eliminated under the proposals presented. Then does the authority go to the National Security Council? Isn't that an agency interposed between the President and the Secretary of Defense, just what we have condemned here? By eliminating the Space Council, would we be simply transferring its functions over to the National Security Council——

General GAVIN. Yes. May I comment on that?

The CHAIRMAN. Sure, I would like you to.

General GAVIN. I may not have been quite accurate in what I responded to your recommendation that we have a man in a decision-making position between the President and the Cabinet, because I don't think we should have.

Mr. HECHLER. No, I am not indicating that.

General GAVIN. Yes. We must not confuse here what industrially is known as a line and staff responsibility. The line responsibility goes from Dr. Glennan and directly to the President. Such advice as he may obtain from sitting with the National Security Council or Dr. Kistiakowsky or any other body he brings in is essentially staff advice, and he must make the decision. That is for him to decide if he wants the best advice such as a senior scientist working with him. But the decision must be his or Dr. Glennan's as to how he does this.

Mr. FULTON. That is my point, as I said to Dr. Hechler, that if he does not mean a decisionmaking person but an advisory person, I would agree with him. But when he would bring it over into the rubber program-type operation, putting a czar in space, which would put him above the Secretary of Defense, above Dr. Glennan on NASA, as well as above the National Security Council, one man, but below the President, then I think you have another level of decision which is a different line of decision than we have now.

Did you mean that?

Mr. HECHLER. Since the gentleman has mentioned my name, could I comment?

Mr. FULTON. I am asking you what you mean.

The CHAIRMAN. The gentleman's time has expired, but I helped consume it, so go ahead.

Mr. FULTON. I think we should settle this point.

The CHAIRMAN. I think so. But I think we are getting far afield from the question that I asked, and which disturbs me a great deal. Abolish the Council, you say you are disposing of one agency interposed between the President and the Secretary of Defense, or between the Director of NASA and the President, but you are simply transfering the duties to the National Security Council.

General GAVIN. Yes.

The CHAIRMAN. Then you are not simplifying the setup. What do you accomplish by abolishing the Space Council? Nothing but a transfer of the functions over to a military council, the Security Council.

General GAVIN. Sir, the National Security Council can consider many matters that would not appear to be purely military. Certainly the composition of the National Aeronautics and Space Council, as it now exists, I must say, surprised me. I can't conceive of those gentlemen, as busy as they are, including the President, sitting down and in any way attempting to resolve these highly technical problems that come to the attention of Dr. Glennan and need decision. If it is a matter of overall planning, concept, where is the United States going in the future, and so on, if it is in space, too, this properly belongs in the NSC I agree with you, this merely passes that to the NSC. In my opinion this is where it belongs.

The CHAIRMAN. If we don't transfer some of the functions of the Space Council to the Security Council, then don't they lapse? Somebody has got to take up that responsibility, isn't that right?

General GAVIN. Yes, that is true, that is true. They rely——

The CHAIRMAN. What proportion of the functions are transferred?

General GAVIN. Well, I don't—there is no need to specify functions being transferred. The present responsibilities of the NSC remain unchanged. The Council is abolished, matters of national policy affecting space, our role in space now automatically come to the NSC. They could. You don't have to tell them, they will be there. Technical problems will remain with Dr. Glennan, and such advisers as he brings in.

Mr. FULTON. Could we finish by asking Dr. Hechler: What do you mean by this proposal that you have made? I had raised a question on it. It is not clear to me, and I don't think it was clear to General Gavin at the time of the question.

Mr. HECHLER. I believe we have had examples in the past, and I cite again the case of Mr. Fred Vinson, who was in effect an extension of the President of the United States in the economic stabilization field. In other words, he was part of the President of the United States; he was above the Cabinet level. He occasionally made decisions, sure, this is true, but they were made in the name of the President of the United States, and as such he was able to help the President move forward the program in a clear-cut manner, which I don't believe would happen if you had to wait for a meeting of the National Security Council or some other board or committee before you resolved this conflict.

General GAVIN. Yes, sir. When you say he makes them in the name of the President of the United States, then he is in a sense an adviser to the President, and only can make them when he knows he has the President's approval. So it is the President's decision, in effect.

Mr. HECHLER. That is correct.

General GAVIN. I would like to add, if I may, in recollecting over the last hour or so, I hope I have not in any way left the impression that I would put any less emphasis on the Department of Defense aspects of space. Absolutely, we must emphasize our defense space program. The reason I want to push the defense program the way I do is I think I can get more done for defense by putting adequate support under NASA and then converting to defense application all that comes out of their programs. I think I can make greater progress by making a main thrust through NASA.

The CHAIRMAN. I think that remark is the key to your statement.

General GAVIN. The defense aspects of space are just compelling, compelling in their urgency for solution and significance to our survival. We must have a fully supported defense program.

Mr. MCCORMACK. They should have an opportunity in having a voice in what NASA will do with the military?

General GAVIN. Yes, sir; they should have.

Mr. MCCORMACK. This is where you come into the human operation.

General GAVIN. I think it does now, though.

The CHAIRMAN. Would you have a division set up there and call it the Military Applications Division?

General GAVIN. In NASA?

The CHAIRMAN. NASA.

General GAVIN. Well, that I would certainly be for the man given the responsibility to decide. I mean this exact thing, he should have enough latitude to do that if he wants to do it, and when he comes in next year you could question how he is operating in the light of the results he has achieved. I would say he should have some section of the Space Agency charged with military application, yes. How he would organize it, as a division, or what, I don't know, but everything he does has military implications, in my opinion, everything.

Mr. MCCORMACK. You know that the Civilian-Military Liaison Committee was deliberately downgraded so as to be for all practical purposes inoperative, don't you?

General GAVIN. I was disturbed by that. I don't know why that didn't work better.

Mr. MCCORMACK. That was done administratively.

General GAVIN. I beg your pardon?

Mr. MCCORMACK. That was done administratively.

General GAVIN. Oh. I didn't understand that. You know, the liaison committee between the AEC and the Department of Defense was very good. I spent many an hour sitting with the chairman of that committee talking about nuclear fission application in many areas, and we got an awful lot done. It was a very useful committee.

Mr. FULTON. Could we just finish on Dr. Hechler's point? Dr. Kistiakowsky is an adviser to the President, he is a scientific adviser. Dr. Hechler's proposal poses a dilemma: Shall we have that person then who acts in the name of the President be a businessman, admin-

istrator, another scientist, a labor man, or a politician? It also raises the question: Shall that person be above the Secretary of Defense on military matters? And shall he be between the President and the Secretary of Defense, a Cabinet member? It also brings up the question whether, on Dr. Glennan, there should be an intermediary between Dr. Glennan and the President.

That would seem to me to make an extra echelon of direct administrative decision, which does not now exist within our constitutional concept. Except in cases of grave emergency, where I can see that it should be done, I would go very slow on that kind of an approach.

Does that state, Dr. Hechler, what the difference is between you and me on this problem of the President's scientific adviser? Does that state it?

Mr. HECHLER. I do not think that this would provide an extra echelon. I think that this would give the President the tools needed for making the decisions that need to be made. I think the key problem that we face in this Nation is one of decision. I believe General Gavin, you have set that forth very clearly in your testimony.

The CHAIRMAN. Do you want to make any statement on this?

General GAVIN. It is quite clear to me the President needs the best scientific advice he can get if he is going to make these decisions, and he should have people such as Dr. Kistiakowsky and others. We must understand, in my opinion, and it is entirely my opinion, I am getting in areas in which perhaps I am not well qualified, I think the President will do things in the best interests of the country with the resources he has anyway, but I can't imagine putting someone in a decisionmaking position over Mr. Gates, over the Secretary of Defense, or over the Cabinet.

If you want to create a Department of Science with a Cabinet member, that is another matter entirely.

Mr. FULTON. I agree with you thoroughly. I would move in the direction of a Department of Science.

The CHAIRMAN. Mr. King?

Mr. KING. General Gavin, I am very interested in the using of space to aggressively promote peace. I am not just talking about the peaceful uses of space.

General GAVIN. I understand.

Mr. KING. I am talking about the aggressive promotion of peace. There is a difference. It has been suggested, for example, that if the United States have a fleet of Earth satellites equipped with long-range camera equipment with telescopic lenses, and so on, and so on, it could accurately photograph all of the strategic areas of the U.S.S.R., transmitting that information back to us so that we could know the whereabouts of all their military installations, their launching pads, and so on, and so on, and in turn that would reduce the great differential that there now exists between Russia and ourselves; that is, differential in the amount of knowledge that we have about each other. Russia knows everything about us and we know very little about Russia. But by the use of these satellites we will learn all of their secrets; therefore Russia will not have that trump card, and will be much more susceptible to a disarmament proposal involving inspection, and so on. In this way, peace could be aggressively pursued through space. Would you care to comment on that?

General GAVIN. Yes, sir; I would. This is not just an idea that has come to my mind this morning, because I have written on this in the past several years ago. When all is said and done, and we get all through talking about space and what it means, I think the most significant thing about space is that it does provide mankind with a resource that would enable him, if he uses it well, to maintain peace on this Earth, and I am talking now of a United Nations space program, well supported by the members of the United Nations. In fact, if the United Nations were planning well now, it should surely be thinking in terms of contributions made by members to the end that we would have in being a United Nations space patrol, or force, that could keep the Earth under surveillance. What bothers me is that if we fail to appreciate the importance of space and are laggard in our own program, there will come into being a Soviet system that will in fact be a surveillance system and it could be so effective as to deny us use of space if we don't appreciate it an do nothing about it. I think when all is said and done, this is probably the overriding aspect of the importance of space. It could mean peace on Earth, and lasting peace, if we had the vision to see what could be done and we did something about it.

Mr. KING. Would you say, then, General, that it is most important that Russia not be in a position where she is dominating outer space and this particular area of surveillance satellites?

General GAVIN. Absolutely; absolutely.

Mr. KING. If Russia were to have 50 or 100 up there completely dominating us, and with us not having a comparable number to in any way check that, it would give Russia a tremendous advantage that would be most disastrous.

General GAVIN. We would live in misery and number our days in unhappiness for not having had the vision to see this coming. If we ever allowed ourselves to get in that position, it would be impossible.

Mr. KING. That is a very strong statement, and I appreciate your making that.

The CHAIRMAN. Will the gentleman yield?

Mr. KING. Yes.

Mr. WOLF. Would you give us for the record some of the writings that you have? I don't mean the details of the writings, but the dates you made them on this subject, and whether they are available.

General GAVIN. Sir, I had a book published several years ago entitled "War and Peace in the Space Age," which develops a number of these ideas in some detail. But it is available on most newsstands. I should add that I am not making anything out of it. I put it in trust for my daughters and it is going to get them to college. Otherwise, I doubt they could have gotten there.

Mr. WOLF. Thank you very much.

Mr. KING. Just pursuing this one step further, in counter to that argument it has been suggested that through the use of camouflage the use of these surveillance satellites could be minimized, if not obliterated completely. Would you care to comment on that?

General GAVIN. You know, that would be a short-term solution to our survival that would come from apprehension and almost hysteria, I would think. The real solution is get out in space and have a capability of our own. You can imagine us living in a world in which we

would have to try to conceal what we were doing because of "Big Brother" watching us.

Mr. KING. I might say, General, that I agree with you a hundred percent, although I don't have the competence to back up my statement. But I am glad to hear you say that.

General GAVIN. Thank you very much.

The CHAIRMAN. Let me ask you this, General. Do you feel this country has really done an adequate planning by way of determining and establishing national objectives in space?

General GAVIN. I don't believe I am now in a position to answer that question. I have not read an NSC document for 2 years, and I am not sure what we are now doing, sir, I am sorry to say.

The CHAIRMAN. In your opinion, what are our national space objectives? I could give you an easy question. [Laughter.]

General GAVIN. Well, sir, all I know is what I read in the newspapers. I know we are building a million-and-a-half-pound-thrust booster that is going to be able to put a sizable payload into space. We seem to be following rather aggressively programs that will give us communications systems in space, surveillance systems, and we seem to be talking about instrumented packages to the Moon and exploration of Mars. We have continued membership in the committee in the United Nations, that is, a continuance of the International Geophysical Year Committee, which suggests to me that we have an interest in the United Nations space program that is rather significant. I am not sure how well we are supporting that. I just know that these seem to be reflections of objectives. That is what these are: they are what I know are happening that would appear to reflect national objectives.

Mr. WOLF. Would my chairman yield?

The CHAIRMAN. I yield to Mr. Wolf.

Mr. WOLF. In light of your comments, I wonder if you feel we should increase our expenditures in space; and if so, by how much?

General GAVIN. I believe that Dr. Glennan has gotten all the money he has asked for this year, and I believe, sir, you yourself said if he wanted more money he shall have it.

The CHAIRMAN. Well, we left the door open to him. If he feels that he needs more money, we will be glad to hear from him in reference to authorizations.

General GAVIN. Yes, sir.

Mr. WOLF. If the kind gentleman—I was asking you, sir, not Dr. Glennan, with all due respect——

General GAVIN. As near as I know, sir; yes. To the best of my knowledge; yes, it is adequately funded.

Mr. WOLF. Thank you.

The CHAIRMAN. Coming back to my question, what you seem to do in your answer is to refer to the means whereby we accomplish our objectives.

General GAVIN. Yes.

The CHAIRMAN. But the million-and-a-half-pound booster, for example, is not the objective: it is the means for the accomplishment.

General GAVIN. No; that is right—that is right.

The CHAIRMAN. What would you say our objectives are? Communications in space——

General GAVIN. Communication, navigation, weather reconnaissance, and the development of capability to explore the solar system as soon as we can achieve the technical means of doing it.

The CHAIRMAN. Do we have suitable general plans? I don't mean specifically, minutely, but on a general overall basis do you think that we have suitable plans to develop the general objectives that you mentioned and others that might come up?

General GAVIN. I am not aware of this, that we have, nor have I been in a position to be aware, as near as I know.

The CHAIRMAN. Don't you think we should have some general plan for the development of space?

General GAVIN. Oh, absolutely. Oh, this is very important, no question about it.

The CHAIRMAN. Who should do that?

General GAVIN. Well, it first comes from NSC, a statement of national objectives. This then finds immediate reflection in NASA's programs and where they are going.

The CHAIRMAN. You mean NASA?

General GAVIN. Yes, sir; after NSC; but it begins with NSC.

The CHAIRMAN. NSC?

General GAVIN. Yes, sir.

The CHAIRMAN. It should first come from the National Security Council.

General GAVIN. Yes, sir.

The CHAIRMAN. By eliminating the Space Council, national planning for space would be transferred to NSC?

General GAVIN. Yes; yes—planning national objectives.

The CHAIRMAN. Right now it should be in the National Space Council, shouldn't it?

General GAVIN. Well, I wouldn't say that this is not contaminated by NSC policy.

NASA surely must reflect agreements reached in the National Security Council on national objectives. Surely its planning must reflect that.

The CHAIRMAN. I am not going to ask you whether or not we should amend the law covering the National Security Council. I recall when we set that Council up in the law I sat in on the framing of that provision. Would you say that the authority of the National Security Council is broad enough to cover overall planning for space?

General GAVIN. Yes; they are. The Administrator of NASA can be brought into NSC on invitation to all the meetings.

The CHAIRMAN. He is not a member of NSC, is he?

General GAVIN. No; he is not.

The CHAIRMAN. Shouldn't the Director of NASA be a member of NSC?

General GAVIN. He should be a member; and, as I say, he could be invited now.

The CHAIRMAN. Then the law should probably be changed.

General GAVIN. Probably so; yes, sir.

The CHAIRMAN. To make him a member of NSC?

General GAVIN. It would be a very good idea.

The CHAIRMAN. Mr. Hechler, you wanted to ask a question.

Mr. HECHLER. I would just like the record to show, General Gavin, that as commander of the 505th Parachute Regiment you spearheaded the invasion of Sicily, and also that you commanded the 82d Airborne Division and jumped into Normandy on June 6, 1944, and as one of the outstanding combat heroes of World War II, I think that you have set forth in a very brilliant way some of our future ideals for the peaceful use of space. I think, coming from a man who has had that experience in war, that you are to be congratulated for having seen into the future what we need in this world, and, indeed, in this universe, for a peaceful use of space through the United Nations. I want to congratulate you personally on that.

General GAVIN. Thank you very much, sir. I would suppose there are many veterans here. Out of 3½ years of combat come certain convictions about your country: One is that it must be served above all else. My being here only reflects my feeling that this is the best way I can serve my country, and I have felt this since the war.

The CHAIRMAN. Mr. McCormack has some questions.

Mr. WOLF. May I associate myself with the gentleman from West Virginia on his remarks?

The CHAIRMAN. I would like to associate myself with the general's answer, too. It was a very fine answer.

General GAVIN. Thank you, sir.

Mr. MCCORMACK. General, you talked about the foreseeable future. I can understand that. But I am concerned with the immediate future.

General GAVIN. Yes.

Mr. MCCORMACK. The foreseeable future under a government of laws which is not going to continue to exist unless we take care of the problems that confront us today.

General GAVIN. Yes.

Mr. MCCORMACK. And in the immediate future.

General GAVIN. Yes.

Mr. MCCORMACK. The challenge still exists, and on the question of survival we must be prepared to do those things that will assure survival.

General GAVIN. That is right.

Mr. MCCORMACK. Now, in connection with the exploration of space, it is one thing to discuss it in a peaceful world and another to discuss it in a world of tensions, high tensions, such as we have now; is that right?

General GAVIN. Right.

Mr. MCCORMACK. So we have to keep our eyes on the ball, the present situation, and the immediate future, in connection with the menace that confronts not only our country but the world. Who is going to defend us in case of war? To whom do we look? You can answer that very quickly.

General GAVIN. We will have to defend ourselves.

Mr. MCCORMACK. The military, isn't it?

General GAVIN. That is right.

Mr. MCCORMACK. So I can see all these things. And I think it is unwise to downgrade the military in the world of today.

General GAVIN. I wouldn't do that. In fact——

Mr. McCormack. Because in connection with the exploration of space and travel in space in the future we have to look to the military to protect our rights, the same as we do the freedom of seas, and so forth, don't we?

General Gavin. Yes, that is right.

Mr. McCormack. As I understand your testimony, if I interpret it correctly, I see your broad outlook about space, peaceful uses, and I can understand that, and I have that in mind too. But you wouldn't put the Defense Department in a position where they would be subject to the veto of the Administrator of NASA in connection with military research and developing military appliances?

General Gavin. Oh, no, no.

Mr. McCormack. Now, the military might not need a 1,500,000-pound booster for today or for the immediate year; is that right?

General Gavin. They do need it, though.

Mr. McCormack. The military?

General Gavin. Yes.

Mr. McCormack. Does it require 1,500,000 pound booster to project an intercontinental ballistic missile?

General Gavin. No, sir; but space is an arena of strategy.

Mr. McCormack. I understand that. I am talking about immediate exigencies.

General Gavin. Yes, immediate, if we had a satellite in being that could be put up in orbit with men aboard, and other things, we would be much better off, our immediate defense position would be infinitely stronger.

Mr. McCormack. That is decided in NASA, isn't it?

General Gavin. That is right.

Mr. McCormack. Yes, that decision has been made by the President.

General Gavin. Yes, but that doesn't deny the Department of Defense from its military application.

Mr. McCormack. That is true. We would expect cooperation and coordination.

General Gavin. Yes, I would expect that.

Mr. McCormack. That was always intended.

General Gavin. Yes.

Mr. McCormack. You would have understanding and cooperation and coordination, and eliminate unnecessary duplication.

General Gavin. Yes. I would like to interject this point, that I am not here to solve any of the problems of the Department of Defense, but if the Department of Defense really wanted to get on with the space business, for example, it should have in being now a space command. We have people taking training over there. I don't know who is doing the space planning, but we should have a space command, and it should be supported by all the services, defended by the Department of Defense, and it should have available to it all the available information coming out of NASA, and we should now have plans, where that command is going to be in 5 years, what its missions will be, what it will be charged to.

Mr. McCormack. Don't judge my mind by any questions I ask.

General Gavin. No, sir.

Mr. McCormack. You came out with a new thought I hadn't heard before, that Defense should have a space command.

General GAVIN. It should have clearly.

The CHAIRMAN. Will the gentleman yield?

Mr. MCCORMACK. Yes.

The CHAIRMAN. I have urged a unified missile command. But you would go further, would you, and have a unified space command?

General GAVIN. Absolutely. You see, of course, that must be unified. It transcends all terrestrial divisions, such as land, water, and sea.

The CHAIRMAN. How would you organize that command?

General GAVIN. I would place it right under the Department of Defense, the astronauts would go into it, you should get the most imaginative and capable man, now, to head it, give him a group of planners, scientific advisers, and have him plan, and they give him the best advice they can. He would come over here to Congress and tell them what he wants and get going.

The CHAIRMAN. In other words, really go all out on a space development program?

General GAVIN. Yes, sir.

Mr. FULTON. Would you yield?

The CHAIRMAN. Yes, I would yield.

Mr. FULTON. This brings up quite an interesting question. Congress has decided that the U.S. policy is to proceed into space by peaceful means and for peaceful purposes. We must not forget that space is a place, and it is not a form of military armament, as such.

General GAVIN. That is right.

Mr. FULTON. Nor is it a military activity. Now, I am in the group that I felt was pretty much in agreement with you, that there is a place in space for the military.

General GAVIN. Yes, sir.

Mr. FULTON. But we are not conquering space, we are going to explore space. So that when those of us who have been delegates for the United States to the United Nations, come up with a solution with Russia on a space committee for the limitation of armaments in space and for the use of space through peaceful means, we at least have agreed on the method, and we are not trying to cut that method down. Now, that brings me to this problem: This Committee on Science and Astronautics is the peaceful pursuit committee in space, as distinguished from the Armed Service Committee that has the missile weaponry programs.

General GAVIN. Yes, sir.

Mr. FULTON. Previously in history we had had the oceans open up the Earth, and unfortunately we did not then adopt the freedom of the seas as proposed—Mari Liberare was the book by Grotius, of the Netherlands. You could see that strategically the Netherlands needed freedom of the seas in order to get out to the rest of the world. Britain had a man named Selden who wrote a book called "Mare Dominorum," dominion of the seas, and Britain and Spain both attempted to get that dominion.

Now, as a matter of philosophy, then, we must see that this race into space does not become a race for military domination, which has led in the world to such disastrous consequences. Therefore, proceeding as this committee does on a broad base, because we want the whole economy to be raised through space activities, for example, I want

maybe to have satellites that will be for the purposes of people with heart attacks; you get a heart attack here, they shoot you up until your body is weightless and your heart can work much more easily under those conditions. Another example, we have the Van Allen belt; if you have cancer maybe you should be subjected to a long period of time to slight radiation, and therefore be in a satellite. If they find you have cancer any more they stick you in a rocket and shoot you up into space.

For example, with the farmers, if we can tell the effect of sunspots on weather 30 days in advance, which we have some indication of doing, we could save possibly, according to estimates of witnesses, $2 billion a year for farmers. And for navigation, for security, we can do tremendous things for the good of the world.

Now, unless we keep those things going along so that neither one encroaches too much on the other—Mr. McCormack's point is very good, that you must maintain present security—but my point is, not at the expense of giving up the peacetime space program. Would you say that is your philosophy, too?

General GAVIN. Well, sir——

Mr. FULTON. You see, there is room for peacetime space programs.

General GAVIN. As a philosophy, I think we are in agreement. I would stipulate, further, however, that out of all of the things that you said will come, unfortunately, to the nation that wants to use them, military applications and military capabilities. This is why the United Nations aspect of this is so important.

Mr. FULTON. But you wouldn't put all of space under the Department of Defense so that the whole space program of the United States is run by the military, would you?

General GAVIN. No, sir; I would not.

Mr. FULTON. Thank you, that is all.

The CHAIRMAN. Mr. Hechler.

Mr. HECHLER. I simply would like to support very strongly your observation that we need a unified space command. I think we can have peaceful uses of outer space and preserve the security of this country, but there is no reason why we have to stagger along with the lack of unification, duplication, overlapping, and competition we now have. Would you care to add anything further to the question of how we can achieve greater unification within the Department of Defense, as relates to the space activities?

General GAVIN. Sir, I haven't been in the Department of Defense for a couple of years and I am not sure I am at all qualified under these circumstances. My observations are mostly philosophical in nature, although the space command is rather specific. This is an old subject here, and there will no doubt be hearings on it this year, but Mr. Gates is doing a good job with the resources he has, and I expect he will do more in the future.

Mr. HECHLER. I want to say I am wholeheartedly in agreement with this suggestion. I think it would be the greatest step forward this committee could take to push that suggestion.

Mr. FULTON. I agree with you.

The CHAIRMAN. I want to say to the gentlemen of the committee that I want to finish here at 5 to 12. We have a letter from the White House that I want read to the committee. So we will recognize Mr.

Quigley. He hasn't asked any questions at all, and then you, Mr. King.

Mr. QUIGLEY. Mr. Chairman, I have no questions. I merely want to apologize for not being able to be here to hear the general's testimoney in full. I merely want to say, with real pride, that General Gavin, of course, is not only a great American and a distinguished Pennsylvanian, but he and I happen to come from the same hometown. Mount Carmel is really and truly proud of its favorite son; General Gavin was not only a brilliant fighter, but expresses brilliantly on the subject of why he fought, and why we all fought.

The CHAIRMAN. Most capable author, too.

Mr. QUIGLEY. Excellent author. His record speaks for itself. I merely want to say for the folks in the hometown that they are truly proud of him.

General GAVIN. Thank you.

The CHAIRMAN. You Pennsylvanian newspapermen better get that.

Mr. FULTON. May I join you in your compliment to the general, because here is an example for modern youth. I believe you went into the Army as a private in 1924, and by 1944 you were a major general on your own effort. That is pretty good. Better than some of the rest of us have done. [Laugher.]

Mr. KING. I would like to ask one short question before our time is up. On this space command, pursuing that just a step further. In the DOD we have ARPA.

General GAVIN. Yes.

Mr. KING. Which ostensibly is to do some coordinating, if I understand its function.

General GAVIN. Yes.

Mr. KING. Wherein does ARPA fail to meet the objectives of the space command that you have discussed, briefly?

General GAVIN. I don't think ARPA is in any respect failing. I think the man who heads ARPA is a very able man. Now, this is a different thing. ARPA operates somewhat in the staff sense, as I understand it. This would in fact be an office established, a man put in charge, responsible for setting up space objectives, developing a capability to perform space missions. I might say, sir, my thinking in this respect is associated with your comment a moment ago about the peaceful potential of space, because only when we show an awareness of our appreciation of what space means, and we could say yes, we could go to the U.N. and make a contribution. We have this Office established, we have a capability, we are planning, we know where we are going, we can support the U.N., then can we get respect in those international councils, then can we move ahead.

Mr. KING. ARPA operates on a lower level? They are more technical, rather than in the broad planning field, are they not?

General GAVIN. Yes, I would say they are. I think they are doing a very good job.

Mr. KING. Yes. My question was not to suggest they were not doing a good job. I just wanted to make certain you were suggesting something over and above ARPA.

General GAVIN. Yes, something different. ARPA acts, as I understand it now, in really a staff advisory capacity to the Secretary of Defense. It is more a staff agency for him. This would be a line

responsibility, as the Army, Navy, and Air Force is, those commands established to exercise domination over the sections of the earth that they have a capability in. This would be a space force, in fact, you see.

Mr. KING. Are you suggesting another department, a fourth arm?

General GAVIN. An agency having the capability of operating in space, yes, if you want to call it that. Now, it would be unified, it might be a step in the direction of unification, since the astronauts now come from the Navy, Air Force, and Marine Corps.

The CHAIRMAN. I don't want to cut the gentleman off, but at this time we had arranged to have a letter read, and I don't want all of the members to get away before it is read.

Dr. Sheldon, you have a letter from the White House. Would you read that letter?

Dr. SHELDON. Mr. Chairman, this letter is from the White House, Washington, March 7, 1960, addressed to the Honorable Overton Brooks, chairman, Committee on Science and Astronautics, House of Representatives, Washington, D.C.

DEAR OVERTON: I have read with interest your February 17 letter concerning the Nike-Zeus program. Of course, an effective defense against ballistic missiles, if one can be contrived, is to be desired by all, which is why research and development on the Nike-Zeus system has been accelerated the last 2 years and will continue during the coming fiscal year. We need to understand, however, that the Nike-Zeus system is one of the most difficult undertakings our country has ever attempted. The technical problems are enormous. In fact, it is not yet certain that even all of the problems have been identified.

For this very reason other possible approaches are also being explored. I have, for example, requested $110 million for the Defender program, which seeks to identify and explore every scientific means toward an effective ballistic missile defense capability.

As of now, the concensus of my most knowledgeable and objective advisers, both technical and military, is that not enough is yet known about ballistic missile weapons to warrant the allocation of the vast material and financial resources necessary to produce and deploy the Nike-Zeus system. This being the case, it would be illogical to initiate production steps in fiscal year 1960 unless production is surely to begin in 1961. For this reason, the $137 million appropriated last year for this purpose will not be used pending a comprehensive testing of the feasibility of this system.

An adequate antimissile defense is important, but the problem is to design and develop an effective system which is adequate to present and projected ballistic missile threats. My advisers report to me that the present design of this particular system has severe capability limitations. The major task right now, therefore, is to concentrate on finding solutions of the technical problems, rather than to dissipate efforts on premature production steps.

My conviction is that the $412 million recommended in the 1961 budget for the Nike-Zeus and Defender programs will enable the Department of Defense to carry forward the concentrated effort started 2 years ago to find an effective solution to this problem, and will allow a wise balance in the marshalling of our scientific resources for this and other significant military and space development programs.

Sincerely,

DWIGHT D. EISENHOWER.

The CHAIRMAN. Now, let me say this. Those of you who missed the panel meetings of Friday really missed a treat. Some of our members were not able to be there, but on the basis of what I have heard from all of the members who attended, it was a most successful meeting. Every one of the panelists I talked to—and I think I talked to every one—wanted a continuation of the program, under which they are invited to work with this committee in an advisory manner.

Mr. Sisk, you were there, and outside of being frozen to death by lack of heat in the building, what is your reaction to it?

Mr. SISK. I certainly agree with the statement by the chairman that it was a very fine and a very productive meeting. Based on that experience, I think it certainly should lead to a continuation and possibly greater emphasis. Bringing these people together into discussions with the committee can be very rewarding, Mr. Chairman.

The CHAIRMAN. I think except for two, everyone who was invited appeared. One of the two will appear before the committee next week. That was the reason he did not come. He is from California. We had panelists from all parts of the United States present, and they all were anxious to participate and they seemed to appreciate the opportunity which was afforded them in coming here to participate.

General Gavin, we want to thank you. I think you have made a very brilliant statement.

General GAVIN. Thank you, sir.

The CHAIRMAN. I think these Pennsylvania boys can claim you are from Pennsylvania, but there are some of the Massachusetts boys that say you are from Massachusetts. I would rather claim you for the United States, myself.

General GAVIN. Thank you, sir.

The CHAIRMAN. We do appreciate your coming down here and your willingness to assist this committee.

General GAVIN. Thank you very much.

The CHAIRMAN. If there is no further business, the committee will adjourn until 10 o'clock in the morning.

(Whereupon, at 12:02 p.m., the committee adjourned, to reconvene at 10 a.m., Tuesday, March 29, 1960.)

TO AMEND THE NATIONAL AERONAUTICS AND SPACE ACT OF 1958

TUESDAY, MARCH 29, 1960

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND ASTRONAUTICS,
Washington, D.C.

The committee met at 10 a.m., Hon. Overton Brooks (chairman) presiding.

The CHAIRMAN. The committee will come to order.

This morning we are pleased and privileged to have with us Lt. Gen. Leslie R. Groves, U.S. Army (retired), vice president of the Remington Rand Co., and former director of the Manhattan project. He is the man that turned loose the big blast, and we haven't been able to cork it up since.

Dr. James R. Killian will also testify today. He is president of Massachusetts Institute of Technology.

General Groves, we are certainly happy to have you here again, and to see that you are enjoying good health and getting along nicely in your retirement. We are glad that your retirement doesn't interfere with giving your assistance and lending your advice and counsel to us when we need it. We are in need of it now.

You have a prepared statement which we will be pleased to hear.

General GROVES. You wish me to read it, Mr. Chairman?

The CHAIRMAN. Yes, sir; unless you prefer to ad lib.

General GROVES. I think I shall read it first, and then amplify it just a little.

The CHAIRMAN. That would be all right. We will then ask you questions.

STATEMENT BY LT. GEN. LESLIE R. GROVES, U.S. ARMY (RETIRED), VICE PRESIDENT, REMINGTON RAND CO. AND FORMER DIRECTOR, MANHATTAN PROJECT

General GROVES. In the invitation to appear before the committee, which to me, of course, is an order, with my background, I merely stated that I would be glad to answer any questions that you might wish to ask me about how the Manhattan project was operated. Then when Mr. Yeager asked me to please have a statement, I prepared a very short one.

I am appearing at the committee's request to discuss with you my experience in conducting the work of the Manhattan project. As I look back upon the period from September 1942 to the end of 1946 during which I had responsible charge of the program which de-

veloped, produced, and delivered the atomic bomb against an enemy of the United States, I can discern four factors which were primarily responsible for our success.

First, we had a clearly defined, unmistakable, finite objective. Although there was considerable doubt initially as to whether this objective could be attained, there was never any doubt as to what it was. While only a few of the personnel engaged in our project know what this objective was, those who occupied the most responsible positions were thoroughly aware of the total objective and were therefore able to condition their every action to its accomplishment.

Second, each element of the project had a specific task. These tasks were carefully allocated and assigned and supervised so that the sum of their parts would result in the accomplishment of our overall mission. This system of compartmentalization, as we used it, had two principal advantages. The most obvious of these was that our maintenance of security was greatly facilitated. But over and above that consideration was the great advantage of its requiring every member of the project to attend to his own business. This resulted in a developmental operation whose efficiency was without precedent.

Third, there was positive, clear-cut, unquestioned direction of the project at all levels. Authority was invariably delegated with responsibility, and this delegation was absolute and without reservation. Only by this means could the many apparently autonomous organizations working on the many apparently independent tasks be pulled together so as to achieve our final objective.

Fourth, the project made a maximum use of existing agencies, facilities, and services, governmental, industrial, and academic. Since our objective was finite, we did not design our organization to operate in perpetuity, a most unusual thing in Washington, I might add. [Laughter.]

Consequently, our people were able to devote themselves exclusively to the task at hand, and had no reason to engage in empire building.

I understand that you are interested in comparing the Manhattan project with the current space program. I should point out that I know little about the space program that has not been published in the newspapers. For this reason, any comparison that I might draw would be of questionable value.

I am acutely aware, however, of the lessons that we learned in the Manhattan project. Our work and our problem there were unique and without precedent. We made many mistakes before we achieved our ultimate success. I am convinced, from our experience, that these principles which determined the success of the Manhattan project are universal and are applicable to any other major undertaking which involves venturing into the unknown.

As I view it, the present space program has a precedent in the Manhattan project. I sincerely hope that the management techniques which we developed or proved at such great cost in money and effort will not be overlooked.

I will be pleased to answer any questions that you may have in futher elaboration or development of the principles which led to the Manhattan project's success.

I would like to add one thing, that when I speak of having authority with responsibility, that does not mean that we were freewheeling

entirely. I reported to the Secretary of War and to the Chief of Staff, and was subject to their general guidance, but they never interfered in anything connected with the project, with the sole exception of the Secretary of War not approving the use of Kioto as a target, which many of you had read about. But that had no bearing on the development or the operation or anything of the kind.

Reports were made frequently, or not so frequently, but when I thought they were necessary, and these reports went to the Chief of Staff, the Secretary, the other interested parties, the President, both Mr. Roosevelt and Mr. Truman, and to other Chiefs of Staff on occasion who were vitally interested in when—particularly when we would be ready and what the effects would be.

I think that gives you a general idea, but I would like to emphasize the importance of a finite mission.

Now, I don't know what the mission of the space activities of the United States are. If they have been explained to you, I would sometime like to see them in writing in about one sentence. My mission was very definite. It was given to me by the Secretary about 2 or 3 weeks after I was assigned to the project. And that was, by the development of atomic energy, to bring the war to an end sooner than it would otherwise be brought to an end, and thus to save American lives.

Now, that was a very definite, finite mission, one that anyone could understand. I don't know, and I don't know whether you know, whether the mission of our present space activities is to land a man on the Moon or to be able to travel around the world in a few minutes, or just what the purpose is, because I think it has been sort of cluttered up in a lot of words.

Now, I may be mistaken in that, but the impression is certainly widespread in the general community in the United States, particularly those who are involved in such matters, that there isn't a definite, sharp objective.

I think that—I am open to questions that anyone might wish to ask.

The CHAIRMAN. You had charge of the Manhattan project, General.

General GROVES. Yes, sir.

The CHAIRMAN. Did you have charge of the arrangement of the organization?

General GROVES. I had charge of everything.

The CHAIRMAN. Everything. So they told you: Here is our objective, to develop the atomic bomb; you go ahead and do the job. Is that right?

General GROVES. The original order to the Chief of Engineers was that I would be relieved from all other duties and would take complete charge of the Manhattan Engineer District.

The CHAIRMAN. And you are an engineer officer?

General GROVES. Oh, yes, by all means. That is one of the reasons it was successful. [Laughter.]

The CHAIRMAN. He got in a good plug, anyway.

Then after you took it over, you told them how much money you needed, and Congress gave you the money. Did you have control of your priorities, too? Could you get the personnel and the materiel that you needed?

General GROVES. Yes. Of course, those didn't come on a silver platter, Mr. Chairman; neither did the money. We started off with a very indefinite idea of cost. The picture on that started, as you may recall, with an allotment of $6,000 by the President to buy some uranium. This was long before I came into the picture. Then it was raised to an estimate of $6 million. Then when the Army Engineers moved into it they estimated somewhere around $85 million, based on what they were told. After I had had it for a few months we put in an estimate that said that this would cost of the order of $400 million under the assumption that of the three methods that we were going to use for the production of fissionable material, that one and probably two would soon prove to be totally impossible.

Now, as you know, although we announced we had spent $2 billion, we actually spent about a billion and three-quarters.

The CHAIRMAN. Congress gave you a billion dollars with no strings attached to it?

General GROVES. Well——

The CHAIRMAN. Congress itself, to a large extent, didn't know what the money was going for.

General GROVES. That is correct. There was a small number of Members of Congress, Mr. McCormack was one, Mr. Martin was another, Speaker Rayburn, and I think two others in the House, and I am sorry that I don't recall their names, who were told about what we were doing in a very broad way.

Then along in 1945, in April, when we were asking for a great deal more money, and certain Congressmen were getting a little bit disturbed on the Appropriations Committee over having just given all the money we asked for, we took five of them down to Oak Ridge and gave them a tour, and when we came back they gave all the money that we needed. We never had any difficulty whatsoever with Congress, and yet I knew that the political lives of certain Congressmen would have been seriously impaired if we had turned out to be a complete failure.

The CHAIRMAN. I may say this to our distinguished witness: That I knew what was going on, too.

Mr. FULTON. Would you yield? The witness should comment on the poor Congressmen on this Space Committee, on what has been happening on the space program in connection with political lives being jeopardized. You should be sitting here.

General GROVES. It may interest you—this may be a little off the subject; but when we got back from this trip to Tennessee, Mr. Taber gave me the only moment of alarm I had on that trip by saying, "Will you come over here, General; I want to ask you a question."

You can imagine what I thought he was going to say, knowing Mr. Taber quite well and also knowing his interest in the taxpayers' dollar. But instead of that he almost knocked me over by saying, "General, are you sure you are spending enough money down there at Oak Ridge?" [Laughter.]

That was the attitude of Congress, and I think it was one of the major elements in the success of the program.

We were never asked questions by committees of Congress in any way. Questions would come to individual Congressmen; the answers

we wrote for them were used. This was true throughout the entire Congress.

The CHAIRMAN. On the second page of your statement you say that this space program has a precedent in the Manhattan project. Is that the precedent that you are talking about, Congress giving them the time and the entire amount of money, with no questions asked? [Laughter.]

General GROVES. No. I think the precedent is that they are going out into the unknown, the unknown scientifically and technically, as well as in other ways. It is a tremendous project, where if you make an experiment, it isn't a $5 or $10 experiment; it may be $20,000 or $30,000, and it may be a few million, and it may be a number of hundreds of millions.

The CHAIRMAN. Of course, you had what would be called a crash program; and if the taxpayer wants to put on a crash program for space, we will have to do what we are doing in a different way. We would have to put up all of the money that needs to be spent and proceed regardless of the cost and the number of personnel and the amount of materiel involved.

General GROVES. I would imagine the first thing would be to find out the objectives of the space program.

The CHAIRMAN. And you are not clear in your own mind as to what our objective is?

General GROVES. No. I have yet to understand what it is. I havn't had anyone explain to me what it is. I think that is the general feeling of the people who may not be as well informed as the members of this committee.

The CHAIRMAN. I think your criticism is correct. There has not been a sharp objective. If I were to state one broad objective, I would say it is to develop space so that we may have a permanent condition of peace in the world.

I think that is all I have to ask you now.

Mr. Hechler?

Mr. HECHLER. General Groves, would you say that the country is in as great a peril today as it was at the time when you conducted the Manhattan project?

General GROVES. I think that it is, but in an entirely different way. You can't just put them on a scale and balance them out. At that time we were faced, again, with lack of knowledge of what the enemy was doing. From what the Germans might have been doing, and could have been doing if they had been properly organized, we were in terrific peril, because they could have gotten there first without any question.

Mr. HECHLER. My question was designed to elicit whether you felt that the necessity for these four objectives was as great today as it was at the time you undertook the Manhattan project.

General GROVES. I feel that the peril today is very great, indeed, for the reason that we can't afford—and this is purely from the military standpoint—we cannot afford to have an enemy or a potential enemy, whichever you want to call him, who has a terrific advantage over us, as he would have if he had made certain space developments and we didn't have them.

Mr. HECHLER. Of course, you were conducting your project under wartime footing, and we are now on a peacetime footing. Do you believe that it is perhaps impossible, under our democratic system, under a peacetime footing, to have the type of organization, with the objectives, goals, and clear-cut authority and power of decision?

General GROVES. I believe they are entirely possible, because I believe the power of decision is inherent in the personnel who are immediately responsible and those who either support them or see what they can do to cut down that power of decision and authority.

You don't do it by having committees and saying: "Well we have to think this over, and let's compromise, and so on and so forth."

Mr. HECHLER. Of all these things that you mentioned, would you say the power of decision would be probably at the top of the list?

General GROVES. The power of decision in the sense that it means that the people that are running things have the power to decide, both from outside and within.

Mr. HECHLER. How often did you see the President during the period when you were conducting the project?

General GROVES. I saw President Roosevelt on one occasion.

Mr. HECHLER. You didn't see him in conjunction with others?

General GROVES. I saw him with Mr. Stimson, Secretary of War. Then I saw Mr. Truman as soon after he became President as the Secretary could get an appointment; Mr. Stimson and I saw Mr. Truman together.

Mr. HECHLER. How often did you see representatives in the White House above the level of Secretary Stimson?

General GROVES. I never saw anyone in the White House, and didn't want to, excepting the President, because they could contribute nothing, and I felt they could do quite a lot of harm. Now, we did maintain first-class relations with the White House through the services of Dr. Bush.

Mr. HECHLER. This is what I was getting at. What did Dr. Bush have to do with your program?

General GROVES. Dr. Bush, now, kept the President, particularly Mr. Roosevelt, informed in a general way. He also, I believe, kept Mr. Hopkins thoroughly informed.

Mr. HECHLER. Would you think there would be an advantage in our current setup of having a person like Dr. Bush who could help pull this whole conglomeration together so that we would have a more clearcut objective—that we would have clearcut and unquestioned direction of the entire space program?

General GROVES. I can't quite answer that directly, because Dr. Bush's function was essentially that of getting the maximum benefit from all scientific research. And the atomic project became so large that Dr. Bush just felt that it was beyond the capacity of his organization to handle it, and very wisely, in my opinion, with the full concurrence of Dr. Conant, who was his alter ego in a lot of ways. He made the recommendation to the President that if this is to be successful in time of war, it should be done by the Army.

Mr. HECHLER. Do you think we are pursuing our space program with sufficient urgency?

General GROVES. I don't believe so. I think we are making adequate appropriations from that standpoint, but I don't get the feeling that it is being done with too much urgency.

Mr. HECHLER. I must say I agree with you, General, and it is an honor to have you before this committee this morning.

General GROVES. Thank you very much, sir.

Mr. HECHLER. That is all, Mr. Chairman.

The CHAIRMAN. He did a great job.

Mr. Van Pelt?

Mr. VAN PELT. No questions.

The CHAIRMAN. Mr. Sisk?

Mr. SISK. Well, General Groves, I think the primary thing that our committee is concerned with at the present time is some amendments to the Space Act.

Now, those of us who served on the select committee which created the Space Act under the impetus and the urgency of Sputnik I, sought to set up an organization with the objectives which you have mentioned. I am inclined to agree with you that our objectives are rather vague and indefinite even today, unfortunately.

Now, there seems to be a feeling that things have not worked too well. I think we are all a little concerned, and of course the administration apparently is somewhat concerned too because they have suggested we eliminate, for example, the Space Council. The administration has also recommended the elimination of the Civilian Military Liaison Committee.

Now, I am interested in the organizational setup that made your Manhattan project go. Were you given more or less blanket authority, and then did you set up the organization yourself, without being guided by law?

General GROVES. I was not given so much authority as I was given an order, and from that time on I had to seek my own authority.

For example, when I took over, I did not have the high priority that we needed to accomplish it. And I had to get from Mr. Nelson, who was then the head of the WPB, the overriding famous AAA authority. Now, that was not easy to procure, because Mr. Nelson frankly didn't want to give it to me. And it took a little—well, it took experience in Washington to get that kind of authority. And I didn't have to go and seek any help, but I didn't hesitate to say that if he wasn't going to give it, I was going to recommend we abandon the project.

It was just as simple as that. You know he wasn't going to let me get out of his office, knowing that the President wanted this project pushed, and hearing me say that I was just going to recommend abandonment because he wouldn't cooperate.

There are times when you have to be willing to do that.

It was the same way within the military; it was very simple. If there was any objection to doing what I wanted, I either had a note sent to the offender signed by Stimson or Marshall, or I told them: "Well, if you don't believe what I say, just go up and ask General Marshall." You know that nobody was going to ask General Marshall, unless he felt absolutely certain. As I say, I had had a lot of experience in Washington. I knew the workings of Congress, for example, so that I was able to get cooperation from individual Congressmen; if they forwarded me a letter from a constituent, I didn't just send it back with a note saying, "No, this is secret, we won't tell you." I sent back a draft of a letter that could be sent back to the constitu-

ent, and the result was that Congress said: "Well, here is somebody who appreciates our problems."

And we gradually moved in and we got more and more control over the situation.

We had many difficult problems. For example, as you know from history, all the diplomatic relations were handled by the Secretary of War, and I was actually handling a great many of those matters toward the end. The State Department was not in it until after Mr. Stettinius became Secretary, and then they came in only at my request, because we would need Mr. Stettinius to do something for us. We had nothing but the utmost cooperation from everybody.

I don't say that it was willing cooperation, but it was the utmost in cooperation. And I didn't care whether it was willing or not. And it wasn't by order. It was usually by exerting influence of one kind or another.

Mr. SISK. I think this rather clearly illustrates that we need a strong man—and I don't want anything that I say here to be considered as a reflection upon Dr. Glennan or anyone else who may at the present time be heading NASA.

General GROVES. I think that is probably true.

Mr. SISK. I mean this frankly, as a compliment. You did a great job, General Groves, and the Nation owes you a great deal of gratitude. Actually, you did not depend upon authority granted to you by Congress and spelled out in detail; you grabbed the ball and ran with it.

General GROVES. That is about it.

Mr. SISK. Of course, this is the thing we seek, but it is a very elusive target. It seems that we need you in the space program.

General GROVES. I don't think so. [Laughter.]

I am very content just to be on the sidelines.

The CHAIRMAN. The general considers that a threat. [Laughter.]

Mr. SISK. I realize, General, that you have earned your stars, so to speak, and I am sure that you are enjoying such retirement as you have. Although you say you are not familiar enough with the organization of the space program to compare it with the Manhattan project, wouldn't you say that basically what we need is a man who will grasp the helm and, through good diplomacy and so on, move ahead and do the things that are necessary to get cooperation?

General GROVES. I think so. I think that everything should be done by the Congress to make it possible for him to do that.

Mr. SISK. What can we do, General Groves?

The CHAIRMAN. The gentleman's time has expired.

Mr. SISK. We have now come to the question that I want to ask: What can we do, except to appropriate the money?

General GROVES. I think that by eliminating everything that prevents the man at the helm from really steering that ship and making the decisions—now, I would like to explain that in our project we did have a supervising group, the so-called Military Policy Committee with Bush as Chairman, Conant as his alternate, General Stark and Admiral Purnell, and initially that group, you might say, really took part in the decisions that were being made. But as time went on, because I was working 16 hours a day or more, 7 days a week and they had other things that they were thinking about, I got into a

position where I knew so much more about everything than they did that as time went on our relative positions changed. Where they were in on the decisions and helping to make them in the beginning, later on they were really just keeping a very sharp eye on me with the objective of telling Mr. Stimson or the President at any time they saw fit that they had better get somebody in my place; that I wasn't doing so well.

That was, as Dr. Bush told me, an accurate description of what we had at the end. But that was a gradual transition, because we did not go in and suddenly upset everything and start on our own. For example, when we took over from OSRD, nine contracts with universities remained under OSRD until the time ran out, and then we took them over, but in the meantime we were running them. We used the Army facilities in every possible way. We didn't even have our own security until we were forced by circumstances to establish our own personal security organization.

The CHAIRMAN. The gentleman's time has expired. This has no reference to the gentleman from California, but we have this morning Dr. Killian, who will follow General Groves.

Dr. Killian was scheduled to be the first witness this morning, but his train was late 3 hours.

Now, I had hoped that we would have ample time to hear General Groves before 11 o'clock, and then give Dr. Killian about 45 or 50 minutes for his testimony.

If there is no objection, that is the way we will proceed.

Mr. Fulton.

Mr. FULTON. I think it will take more than this committee to finish General Groves. He is pretty healthy. [Laughter.]

Mr. FULTON. Of course, you have been on one of the thresholds of history, and that threshold largely depended on you alone. Did you ever think what the effect might be on the world in the future after you completed your job? Not for the particular reason you did it, but come the quiet peace and the rivalry among nations, and the 1960's which we are just entering, did you ever think what was going to happen in the sixties after you had opened this Pandora's box?

General GROVES. I started thinking about that about the middle of 1943, and really started to think a good deal about it from 1944 on. And in that I was joined by Dr. Bush and Dr. Conant and Purnell and Stark, and then as time went on, by some of the scientists whose work was easing off a little bit. We did think about it seriously, and all of the problems that this would lead to, and the advantages from the standpoint of the effects on world peace.

Of course, what I think has happened is that for the first time it was proven to the world in unmistakable language that war between major powers was impossible from the standpoint of the welfare of either side.

Mr. FULTON. I think that is your place in history, that you have made major wars impossible. As a matter of fact, I compliment you as being one of the key people that have been responsible, since 1945, through 1960, for our having had the most peaceful era the world has ever known.

Secondly, that it has made casualties from war in that period less dangerous in full effect for those that have taken place as a result of the

automobile. So I think you have contributed, and I think it should be said to you publicly. But did you ever feel this—I guess you had read "Aladdin and His Lamp"; to find yourself in history cast in the role of the first rubbing of the lamp. Did you ever feel that since this is a world that is made up of carbon, nitrogen, oxygen, hydrogen, tremendously explosive elements and mixtures—did you ever think you might be one step to the end of the world?

General GROVES. Well, yes; that was discussed, too. But after all, you can't predict these things. When you start to go downtown in Washington, you don't think about the chances of crossing the street safely.

Mr. FULTON. But you felt it was worthwhile—I was in the Pacific at the time in the Navy, so I was very pleased that it was done. But I must say that the question is, in long-range history, do you think that it has been worthwhile, that the United States went ahead with the crash program and has come up with the possibility of destroying the world?

General GROVES. I believe that that is best explained by my first comment to General Marshall in presenting the first report in December of 1942, in recommending that we go ahead with this project, despite the risks involved and the uncertainty of success. I stated that I felt the controlling reason was that unless we did it, there was a 95 percent chance that it would be done by somebody, and that that might very well be done by a group of power-hungry men such as the group that had existed under Hitler and Mussolini. And I think that events have borne out the truth of that comment. That was one of the controlling factors in our determination to go ahead with the project.

Mr. FULTON. You had said that the Congress was supplying enough money. Actually, this committee, by authorization, is furnishing all the money that the President had requested for the so-called aeronautics and space science programs. The appropriations committee had cut those amounts down somewhat. But in general, the money was provided. You have said, however, that in this particular field you were not quite satisfied with the progress.

Of course, when you first started out on atomic and nuclear energy, it was slow going, just like starting a locomotive—just like getting a train crew, just like learning the signals; it is making the mistakes and retracting, or it is going down blind alleys and findings our mistakes. Now we are in that period in many projects in space. Don't you think that it is just about the same position you were in?

General GROVES. Well, the only difference is that this is a long time since we started investigating space, and it didn't take as long to develop atomic energy as they have now had. Now, I am not saying which is the hardest to do.

Mr. FULTON. You have said yours was a finite program with a clearly defined unmistakable finite objective. Well, space is infinite.

General GROVES. Space is infinite, but I think our assigned objective can be finite.

Mr. FULTON. Then let me ask you this. We have both an aeronautics field, and that of course involves the Century series planes, the fast all-weather long-range bombers; likewise it represents civilian planes, it represents the X–15, the X–17. You have no complaint

on how Dr. Dryden ran NACA and is now operating on the aeronautics field, do you?

General GROVES. No, I have no complaint. I was just trying to compare what I might say were the reasons for our success and my general impressions as to what is holding back on space.

Mr. FULTON. Now with respect to research; we have research of all kinds—life in space, magnetic fields, every kind and variety. We also have missiles, boosters; we have IRBM's, ICBM's. Do you feel that the trouble is with the number of missiles or should we go ahead now and have more research before we say settle off on a Thor IRBM, or an Atlas ICBM—the first generation?

I was on the aircraft scheduling unit in World War II helping schedule planes, and ours was always the question of the cutoff on a particular thing. When did you cut it off and put it into department store production? Now the question is this: At this particular time do you think we should stop the emphasis on research and development, and go into a broader program of production of missiles of this generation?

My judgment is: No, I would go ahead with research.

General GROVES. My judgment is "No," also, but at the same time you have to have a reasonable supply of weapons on hand or else you may find yourself in a very embarrassing position. I believe it requires the closest cooperation between the requirements for defense and the requirements of the Space Agency, whatever they may be.

The CHAIRMAN. Mr. Anfuso?

Mr. ANFUSO. Mr. Chairman, before I ask one or two questions I would just like to keep the record straight, and I am sure that my friend from Pennsylvania also wants to keep it straight. On the question of appropriations, this Congress, to my knowledge, has appropriated all the money that the President has asked for. As a matter of fact, we have appropriated money which the President has not used. One case is the Mercury project. The House cut some $27 million, but that was immediately restored.

Now, with that correction of the record, General, I want to congratulate you for being here. To start up where Mr. Fulton left off when he said we should go ahead with research: You made the observation that we certainly should have an immediate amount of supplies. Don't you think that in this emergency we should have both, we should continue with our research and at the same time have an adequate amount of supplies for defense?

General GROVES. Yes. And that is where the greatest capacity for decision is required, to know just when to cut off. When do we take the chance? You can't be 1,000 percent safe; you have to take a chance.

Mr. ANFUSO. General, this leads me to this question: I would like to have you tell this committee what is our status with regard to the Russians? Are we at a war with the Russians, are we at peace with the Russians, or are we somewheres in between?

General GROVES. I can't define it, because I know nothing but what I read and surmise.

Mr. ANFUSO. What do you think?

General GROVES. I certainly would not say we were at war, and I couldn't say we were at peace. I see no signs of being on friendly

terms, although the indications are that things are getting better. There is certainly every indication of that, but I am afraid we all have a certain distrust because we know that in the past the Russians have never kept any agreements. And we know that they have the oriental approach which we don't quite understand ourselves, no matter what we like to think.

So I just feel that we must be very friendly and at peace, but we had better keep our eyes on them.

Mr. ANFUSO. The safe thing to do is for this country to be as strong as possible and to be stronger than Russia, if possible, is that right?

General GROVES. Yes. But I think that strength implies things not only purely the number of weapons you have, but what is your entire strength as a nation. And that includes the economic strength, it includes the industrial backbone of the Nation. You just can't say that because we have more bullets than they have, therefore we are stronger.

Mr. ANFUSO. That is exactly what I meant, General. Strength in my estimation, means not only military strength, economic strength, it means our relationship with other nations, just how we stand with them, how friendly are they to us, how much can we count upon their strength. All that is included in our posture, isn't that correct, sir?

General GROVES. That is correct.

Mr. ANFUSO. Would you say that at this time we ought to have in this space program someone who can supervise the military as well as the peaceful uses of outer space, a man in between, close to the President of the United States, a man like yourself, for example, who could say to the head of NASA or the Secretary of Defense: "Well, now, if you have any questions, go see President Eisenhower," or whoever the President might be. What I am referring to, would you advocate or would you be in favor of having a sort of a space czar, and if you are ready to accept that position yourself I am ready to nominate you.

General GROVES. Well, the answer to the last one is "No". [Laughter.]

One thing that I would like to emphasize is that from my experience I would very much prefer to see any such czar report to a Cabinet officer, rather than to the President. For example, in my own case, I could see Mr. Stimson any time he was in Washington. I might not see him the exact minute I wanted to, I couldn't just go and barge in, but by telephoning his office there would be an appointment made and I could see him.

Now, that is not the way at the White House; you don't know how many days you are going to wait, what is going to interfere, the President simply does not have time to go into all of the details. Now, in his diary which I have been reading, Mr. Stimson has emphasized that from about the 1st of January 1945, every day he was devoting more and more thought to the atomic program, so that by May it was almost everything, everything else was a side issue. Well, you need that advice for anyone who is running an affair of this kind, because to be the one man up there with nobody to go to is a very lonely position that is going to result in failure.

Now, I had Mr. Stimson, I had the Chief of Staff, I had the four members of the Policy Committee, any one of whom I could go to any time that I wanted to.

Mr. ANFUSO. Thank you, General.

The CHAIRMAN. Thank you very much, General.

Now, are there any further questions? Some of the members came in late, they didn't hear the general's statement. Mr. Daddario, do you have a short question there?

Mr. DADDARIO. Yes, I do.

General, I am struck by the statement you made in reference to the Manhattan project when you made the recommendation that it should proceed, you felt that if we didn't do it there was a 95-percent chance that somebody else would.

Now, do you believe that there is the same type of urgency to overcoming our problems and getting into outer space, and can this be accomplished in peacetime conditions, such as we face?

General GROVES. My answer is "Yes" to both of them. When I speak of the urgency of getting into space I am referring to urgency from the military standpoint. There are certain things that are very definitely needed from the military standpoint, and that is excluding entirely the international prestige element of who gets to the Moon first. I am talking about where there is a direct application from a military standpoint. There I think it is extremely urgent and that everything should be done to be sure that the needs of the Military Establishment are being met and aren't being thrown to one side in favor of something that may be a little more dramatic in the newspapers.

Mr. DADDARIO. Now, when you take all of these and put them together and take the statement that you have made, also, that you see a lessening of the tensions between ourselves and the Russians, the question that comes to mind is the additional complications which might ensue if the Chinese were able to develop for themselves an atomic capacity.

Now, with your knowledge of what it takes to put this kind of a program together, can they develop that capacity?

General GROVES. I think they can, particularly if Russia has been foolish enough to help them. I am speaking now from Russia's own standpoint.

Mr. DADDARIO. And since they can develop that capacity, it would be normal and logical that they could adapt that capacity to a space program of their own? That is also possible?

General GROVES. Well, subject only to the financial strain, where they would get the money.

Now, space is still extremely expensive, and so is atomic energy, you know that from the bills you pass every year.

Mr. DADDARIO. Yes. But it does add a complication.

General GROVES. It adds a complication.

Mr. DADDARIO. To this picture. If we project ourselves into the future it is something that we have got to consider insofar as the importance of carrying through a successful program of our own is concerned, because we are not concerned about today, but for the years ahead, 20, 30, 40 years ahead.

General GROVES. That is particularly true from the standpoint of some of the space problems that the Military Establishment is so anxious to have solved, from what I can see of the picture and what they ought to have solved.

Mr. DADDARIO. Thank you, Mr. Chairman.

The CHAIRMAN. Now, at this time the committee will stand in recess for 3 minutes. We have two distinguished witnesses here today, and the press wants to get some pictures of them, and I have agreed to give Dr. Groves' and Dr. Killian's consent to the pictures being made. We are in recess so the press can get the pictures. We will reconvene in 3 minutes.

(Recess.)

The CHAIRMAN. The committee will come to order.

This morning we are happy to have as a witness a very busy man, an outstanding American, and a very able educator. I refer to Dr. James R. Killian, Jr., who is president of Massachusetts Institute of Technology, the former scientific adviser of the President of the United States.

Dr. Killian, I would like for the record to show that I had the privilege of visiting MIT last year.

Dr. KILLIAN. I am happy you did.

The CHAIRMAN. To talk about affairs of the committee, and everybody was very fine to me there.

Gen. John McCormack, who by the way, is a former Louisianian—was there, and presiding. So I wish you would convey my greetings to him and to the others.

Dr. KILLIAN. Thank you.

The CHAIRMAN. You have a prepared statement. We understand you are trying to make a plane to get back to MIT. We are going to try to speed your program up. If you will proceed with your statement, we would appreciate it.

Dr. KILLIAN. Thank you, Mr. Chairman and members.

I apologize for being late, but I was trapped on the Federal Express, the hotbox, as indeed your colleague Mr. Anfuso, was, so we both were late.

STATEMENT OF DR. JAMES R. KILLIAN, JR., PRESIDENT, MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Dr. KILLIAN. My statement directs itself primarily to the proposed amendments in the Space Act of 1958. In my judgment, these amendments have arisen out of experience and represent an evolutionary development of our national space program and its organization.

They recognize the essential differences between civilian and military space programs.

From the beginning it has been my view that the Federal Government had two and only two acceptable alternatives in creating its organization for space research, development, and operation. One was to concentrate the entire responsibility, military, and nonmilitary, in a single civilian agency. The other was to have dual programs—a program of space exploration and peaceful space activity under the management of a civilian agency and the military space program under the management of the Department of Defense. This second alternative was in effect adopted by the Congress and I believe it to have been a wise choice. A possible third alternative, that of putting our entire space program under the management of the Department of Defense, always has seemed to me to have so many defects as to be practically excluded as a solution.

This is true because space exploration involves numerous activities and objectives that are outside the defense domain.

A space program for the United States, if it is to be adequate, must embrace the following four factors, as described by the President's Science Advisory Committee:

> The first of these factors is the compelling urge of man to explore and to discover, the thrust of curosity that leads men to try to go where no one has gone before.

This is a very fundamental human instinct, and we must recognize it in our planning.

> Second, there is the defense objective for the development of space technology. We wish to be sure that space is not used to endanger our security. If space is used for military purposes, we must be prepared to use space adequately to defend ourselves.
>
> Third, there is the factor of national prestige. A strong and bold space technology will enhance the prestige of the United States among the peoples of the world and create added confidence in our scientific, technological, industrial, and military strength.
>
> Fourth, space technology affords new opportunities for scientific observation and experiment which will add to our knowledge and understanding of the earth, the solar system, and the universe * * *.

These four basic objectives coupled with a national purpose, as stated by the act of 1958, itself, that "Space be used for peaceful purposes for the benefit of all mankind" make it manifestly necessary to have a space program that is civilian oriented and not shaped exclusively toward military objectives. They also require that we have a defense-related space program directed at augmenting our military strength, wherever possible and practical, by capabilities in the theater of space. Military space developments, as they emerge, will be, and must be planned to be, an integral part of the basic military missions, such as communications and reconnaissance, and not some separate basketful of operations vaguely categorized as "space."

For these reasons I have always been persuaded that it is not possible to carry out all these objectives as part of a single package. The military and nonmilitary parts of the space program cannot, without damage to each, be consolidated into a single program, whether military or nonmilitary.

Another practical and historical consideration has always made it difficult to contemplate taking all space activities out of the Department of Defense and vesting them in a single civilian agency. I refer to the close relationship of missile technology to the technology of space vehicles. The Department of Defense clearly must be engaged in missile development and operations. Moreover, it has had sustained experience in the development and boosters for missiles which also were useful for space vehicles. It has had the boosters which so far the space program has had to use.

These are some of the obvious reasons why we are led by historical imperatives and the hard facts of life, and of technology, I might add, to have two space programs, one military, and one nonmilitary, and why our organization of space activities must rest upon a conceptual separation of space exploration from defense activities in space.

Faced with this basic separation of concepts, our problem is to define as clearly as possible the role of the civilian space agency and the

Department of Defense and by this clarification to strengthen control and to reduce overlapping, duplication of effort, and misunderstanding, and also to sharpen the decisionmaking responsibility. It is my judgment that the amendments recommended by the President will contribute toward this sharper separation of responsibilities and functions and to stronger control.

In the beginning there were convincing reasons why the President should be charged with an unusual degree of responsibility for developing and monitoring a comprehensive space program and for giving him a National Aeronautics and Space Council as an advisory body to assist him in performing this complex function. This arrangement was good for the initial period when the new agency was finding itself, and when there were so many intricate relationships to be untangled and numerous points of views to be represented. Now that NASA has become a going concern, now that the Department of Defense has shaken down its space program, and now that immediate and long-range objectives are more clearly defined, it seems to me unnecessary to prescribe for the President such an unusual degree of personal responsibility for details and to expect that the Aeronautics and Space Council will continue to be a necessary or desirable advisory body.

I concur also in the conclusion, based upon experience, that the Civilian-Military Liaison Committee should be dropped. I do not see any way to make it effective.

While I believe that the proposed amendments will help, I recognize that we will have a continuing problem of liaison and coordination between the NASA program and that of the Department of Defense. It should be recognized as a continuing requirement that NASA and DOD must "advise, consult, and keep each other informed," that liaison be conducted at many levels, involving both technical and administrative officials, and especially that coordination and communication be achieved by close relationships between those who have management and decisionmaking authority.

This is particularly important that this close relationship exists between those who have decisionmaking authority. This communication, liaison, and coordination cannot in my judgment be adequately achieved through the narrow mechanism of a device such as the Civilian-Military Liaison Committee, nor can it be appropriately achieved by the appointment of a "czar" who would stand above the Secretary of Defense and the Administrator of the NASA. Such a czar would preempt the proper authority of the Secretary of Defense and the Administrator and could introduce serious and dangerous conflicts in the executive branch.

The President has better means than this for achieving coordination—means that do not denigrate the authority and position of the Secretary of Defense and the Administrator of NASA or complicate the relationship of these two officers with each other and with the President. In expressing these views, I do not seek to minimize the continuing problems of coordination and avoidance of inefficiency. Both the Executive and the Congress will have to exercise diligence to keep the two space programs marching ahead in harmony, each in its own path. No liaison committee or czar can substitute for this diligence.

An analogy is frequently drawn between the AEC and the NASA, this analogy being used in support of a Military Applications Division in NASA or Military Liaison Committee or a plan for putting all space activities, military and nonmilitary, in one agency. I am not convinced that this analogy is apt or sound. There are great differences between our space programs and our atomic energy program today. Our atomic energy program, much more than space, rests upon a coherent technology and it involves the control of identifiable physical materials.

Space, in contrast, involves multiple materials and technologies. It is by no means clear that the two fields call for similar management instruments. Consider, for example, the technology of tracking and surveillance which must be dealt with by both the DOD and NASA. There is no comparable interlocking in the atomic energy program.

So far we have gone through a period of rapid buildup and adaptation in our space program. We have had quickly to improvise both in management methods and in technology. Now we are reaching the point where organization and programs are stabilizing. It is imperative, it seems to me, to avoid radical changes now. The problem now is to achieve excellence and high performance. We will not at this stage contribute to these objectives by drastic reorganization. Help can be given by such refinements as have been proposed in an otherwise excellent act.

In the event that these changes are adopted, I venture to suggest that the kind of "activities coordinating committee" suggested by Secretary Douglas would be desirable but I think it unnecessary to require it by legislation.

I suggest, further, that the Administrator of NASA should appoint a strong advisory committee for his own use, this committee to include scientists, engineers, and broadly experienced public representatives. I suggest, thirdly, that the Administrator should have available and make effective use of a strong science advisory committee. Our space program has shown superior strength in achieving "firsts" in space science. We should exploit this strength and leadership to the fullest, moving from strength to greater strength. We can do this by drawing fully upon the great and varied resources of the American scientific community in universities, industries, and Government. NASA is in a good position now to do this provided it does not become too "inhouse" oriented. This suggestion does not infer that NASA should not maintain strong in-house strength. It does emphasize the importance of its not becoming inbred.

I suggest, fourthly, that NASA must continue to conduct research and development in aeronautics to insure our continuing progress and leadership in this field. Of course, it is. I hope it will not let the glamour of its space activities prevent it from making the important discoveries and advances in the future that the NACA did in the past. Especially is it important that it be responsive as it has been in the past to military needs in aeronautics.

In conclusion, let me emphasize my conviction that success in our space programs depends not so much now on more money or on drastic changes in control and management. It depends now on the development of high performance and reliability in our space

technology. This is the crucial area at this juncture and one that must command the sustained effort of the DOD and the NASA. It is heartening to note that both are now giving systematic attention to reliability programs, that is, a special kind of statistical and technological examination of reliability and how one can predict it and how one is making sure that one is getting the maximum reliability. The achievement of high performance and reliability—of really superlative engineering—also rests heavily upon the industrial companies who have contractual responsibilities as well as upon the Government.

This drive to achieve superlative engineering in our space program imposes many requirements. We must have, and understand the importance of, analytical engineering or applied or supporting research—the sophisticated scrutiny of available knowledge to determine what sort of things are possible to build and whether they will work. We need to do exhaustive component testing and to allot the time and facilities to permit this. In a field of technology as complex and advanced as space technology, we have need for more of a new breed of engineer-manager—a man who has a deep understanding of the technical components of a great space system and who can supervise their integration into a working whole. This calls not only for a deep technical understanding as well as the managerial skills to direct the human effort needed to create a system—a space vehicle—which will meet the requirements of schedule, reliability, and costs.

These factors bearing on engineering excellence are crucial at this stage of our space program. Whatever is done in organization, in funding, and in planning should have them clearly in mind. Above all we now need stability in organization and management so that sustained and undiverted attention can be given to the achievement of excellence and high performance, in all of our space undertakings.

The CHAIRMAN. A very splendid statement, Doctor. We appreciate it very much.

Now, we told Dr. Killian that we were going to get him away as soon as possible after 11:30. If there is no objection, I will go around and each member of the committee can ask the doctor one question. I am going to ask my question now.

Doctor, on page 2 of your statement you refer to the elimination of the Space Council. I want to ask you this question: The National Security Council is charged with the responsibility of policy level decisions for the security of the country. In the event you eliminate the Space Council, which is also charged with similar high level responsibilities where would you place the authority that now exists in the Space Council? Whom would you give it to, the President, the National Security Council, or to the executive branch generally?

Dr. KILLIAN. I think one must look at the different objectives and parts of our space program to answer that question. In the field of security, which is the responsibility of the National Security Council, it seems to me that it is perfectly clear and proper for the space activities that relate to defense to come into the National Security Council for its consideration as a part of its total responsibility for national security.

I think there is a clear function there to be performed, and I think there has been a problem of coordination between the Space Council and the National Security Council, because there was overlapping of interest there in the defense field.

In regard to the space exploration part of the program, it seems to me that there are several different ways that one can achieve the functions that the Space Council was supposed to achieve. First of all, it seems to me that by giving a more sharply defined responsibility to the Director of NASA and to the NASA as an organization, that one gets the decisionmaking responsibility where it can be performed rapidly and well, not by a committee, but by an administrator.

This administrator, however, must cooperate carefully with the Secretary of the Department of Defense, must be sure, along with the Secretary of the DOD, that he has the relationships and the contacts and the communication to be knowledgeable, each about the other's program.

In the event they find it impossible to agree about the separation of activities between the DOD and NASA, then it seems to me, as provided, that they should have to take this to the President for him to make that decision.

The CHAIRMAN. Thank you, Dr. Killian.

Dr. KILLIAN. I also think it is relevant that the advisory committees that I suggest would help to provide, again, some of the functions of the Space Council as it was set up.

The CHAIRMAN. Mr. Fulton, do you have one question?

Mr. FULTON. The question comes up as to whether this program on so-called space and missiles, both research and development, is being adequately handled. Likewise, whether we should go ahead emphasizing research and development, or make a cutoff point and go into the broad production of the many missiles, both IRBM and ICBM, centering our chief attention on that for U.S. security purposes.

I don't agree with that last point of view, and I think it should be more a balanced program, a long-range program with our own scientific and military targets adequately balanced, and not done so much in conjunction with a possible enemy, because then he is calling the turn on our policies. What do you think?

Dr. KILLIAN. Mr. Fulton, I think I would give the same answer to that question that General Groves did. I think we must continue research and development to make sure that we are anticipating and achieving further developments down the road. We must also be sure that in the programs that we have had, if they have reached the point where we have hardware that can be used, we have adequate weapons to do the job that seems to be the military requirement that we face.

So I think you have got to have both. I also think that it is always important to be able to reach a point where one makes a decision to go ahead with the development and take the risk of going ahead with that development in order to get the hardware on time.

Mr. FULTON. So that——

The CHAIRMAN. Mr. Anfuso.

Mr. FULTON. Just one minute. Part of my question is not answered. You did not answer it on the adequacy of the program that really has inherent in it the missile gap. You did not answer that portion of the question.

Dr. KILLIAN. Yes. Let me make this comment on our space program. I don't know how one measures adequacy in a program of this kind. It is my judgment that we have funds ample to do the job that is before us in the space field at the present time. I think we

still have problems to solve in making our technology as effective as it ought to be, and I think these problems are being worked upon. I think we have really made very excellent progress since the establishment—since the passage, rather—of the Space Act, in the building of the new agency and in the space activities that we have. We have not yet achieved the reliability in space vehicles that I would like to see us achieve. I think this is the best kind of answer that I can give you on it.

The CHAIRMAN. Mr. Anfuso?

Mr. ANFUSO. Dr. Killian, the way the bill is set up, it provides for a division of responsibility between DOD and NASA.

Dr. KILLIAN. Yes.

Mr. ANFUSO. And in case of any dispute, either one or both can go to the President. Now, General Groves made a very interesting observation. He said: "Well, don't go to the President, he is going to be too busy; you should go to a Cabinet officer."

What do you think of the idea of changing the title of the Department of Defense to the Department of Security, so that he would be both in charge of the peaceful as well as the military uses of outer space? Then you would go to a Cabinet officer.

Dr. KILLIAN. I think that the Department of Defense, with its present responsibilities and definition, has a large job to do. It is a large Department, and I have grave doubts about the wisdom of enlarging its responsibilities in that sense, and I am not sure that changing its name would be significant. I think that is the only candid answer that I can give you to that.

The CHAIRMAN. Mr. McDonough?

Mr. MCDONOUGH. Dr. Killian, do you find anything to be severely critical of the progress we have made in the space program up to the present time?

Dr. KILLIAN. Well, I can express the wish that we had started earlier. We didn't, and that is one of the reasons why we have some of the problems we have today. I think that we have, as I have said in my statement, real problems to solve in getting our technology sufficiently reliable and effective to do the job. I have some other kinds of concerns. We have, I think, had an all too great tendency to be diverted sometimes by glamour objectives, rather than objectives that meet more specific and immediate and real needs.

I think the problem of distinguishing between things that are purely glamorous and things which are important and timely and real is a problem that we have to deal with throughout our whole national situation. I also think that it is of the very greatest importance, as we look at our total national situation, to do all that we can to strengthen engineering in the United States, because engineering—we commonly mix engineering up with science—is one of the fundamental tools that we have to use in achieving high performance, both in military technology and in space technology. This goes back to my own profession. I think it is very important that we do everything we can to strengthen engineering education in the United States and to enhance the role of the engineer and to clarify the role of the engineer.

These are some broad things that I think are important, but we cannot look at details without taking into consideration some of these very broad requirements.

The CHAIRMAN. Mr. Sisk?

Mr. SISK. Dr. Killian, on page 2 of your statement you agree that the CMLC should be dropped, since you don't see a way to make it effective. My question goes to the point of whether or not it was ever given an opportunity to be effective. Section 204(b) of the act provides that the administration and the Department of Defense through the liaison committee shall advise and consult with each other, and so on.

Dr. KILLIAN. Yes.

Mr. SISK. Was this CMLC ever given an opportunity, based on information we have, to actually function?

Dr. KILLIAN. I have not had an opportunity to watch that committee or to inform myself fully about how it attempted to go about its job. But from the start I have had the feeling that a committee located in the level of the hierarchy that it was, had a very difficult assignment to undertake. And that if you are going to get real coordination, you have got to bring together the people who have the power of decision, and this committee was not, I think, set up to do that. If you are going to get decisions and move ahead rapidly and really get coordination, you have to bring at all levels the people who can say: "Well, this is what we are going to do," and go ahead and do it.

The CHAIRMAN. Mr. Van Pelt?

Mr. VAN PELT. Dr. Killian, it is certainly refreshing to read in your statement this one sentence, "Our space program has shown superior strength in achieveing firsts in space science," for I believe far too often we have heard other remarks that have sort of placed us in a second-rate position. The beginning of that paragraph, "The Administrator of NASA should appoint"—I am convinced that that is the better approach, rather than by legislation or Executive order of forcing a committee on the Administrator.

Would that be your position?

Dr. KILLIAN. Yes, this is my position. And may I say just something about your first comment here, which I think is important? This last Pioneer V probe that we have sent up is really a very remarkable performance. It also has some interesting aspects, in that it rests upon indigenous American technology. The fact that in this country we invented and developed the transistor in the communication art, and that all of these things have been flowing out of that very remarkable development, for which two of our scientists got the Nobel prize. This is illustrated in the performance, extraordinary performance, of this particular satellite, and it shows that if we concentrate on the things that we have indigenous capabilities to do, we can pull them off and do them very well.

I feel very strongly that in our space program we ought to concentrate on those things that reflect our own particular genius and capabilities, that reflect the things that we think are important to do and are not determined by trying to keep step by step in a race with the Soviets.

Mr. VAN PELT. Thank you very much.

The CHAIRMAN. Mr. Hechler?

Mr. HECHLER. Dr. Killian, in the President's message to Congress on the 22d of February 1960, which is a message on U.S. aeronautics and space activities during the year 1959, I was a little disturbed that the report was arranged in a series of chapters describing activities of

the National Aeronautics and Space Administration, activities of the Department of Defense, activities of the Atomic Energy, and so forth. My point is that in this report—and also this is indicative of much of the direction that our program is moving, it seems to be moving in a series of independent pieces, rather than a coordinated overall program—I find, as a Member of Congress, difficulty in ascertaining just how to vote funds for this program when we don't have the type of overall view, which I believe could and should be presented.

Now, you say at the end of your statement, "Above all, we now need stability in organization and management." According to the dictionary, the definition of "stability," the aeronautics definition, is "that property of a body which causes it, when disturbed from a condition of equilibrium or steady motion, to develop forces or movements which tend to restore the body to its original condition."

Now, I trust that the stability just doesn't mean that we in Congress are disturbing the equilibrium a little bit and then it goes right back to its original condition.

Dr. KILLIAN. I was not using that term in the technical aeronautical sense. [Laughter.]

Mr. HECHLER. What I would like to ask you, is: Isn't our greatest need not coordination and liaison, but the power of decision, the point of overall leadership and clear-cut direction, and how can we achieve that?

Dr. KILLIAN. I would reiterate my own feeling that the way to achieve that is to first of all have a conceptual separation between the defense program and the space exploration program, then expect the Secretary of Defense to provide this power of decision in the defense program and expect the head of NASA to provide it in the space exploration program.

Mr. HECHLER. Which is simply fragmenting it?

Dr. KILLIAN. But they are essentially two different programs, and as General Groves was pointing out, we very much need a kind of urgency, perhaps, in the defense program that we don't necessarily need in the NASA space exploration program. But we also must have a complete understanding on the part of both as to how they can support each other and further the programs of both. But I think that you can do more by this separation, instead of having the concept of a comprehensive space program that includes both defense and space exploration, to recognize the difference between the two of them and give the responsibility clearly to the two agencies to carry them out.

The CHAIRMAN. Mr. Bass?

Mr. BASS. I have no questions, Mr. Chairman. I want to add my word of welcome to Dr. Killian and express my appreciation for his coming here to testify before us at this hearing.

I find your statement impressive and most persuasive.

That is all.

The CHAIRMAN. Mr. Moeller?

Mr. MOELLER. In deference to our witness, I will yield. I know he wants to get away.

Dr. KILLIAN. You are very kind.

The CHAIRMAN. Well, Dr. Killian, we certainly appreciate your appearance before the committee. I wish that we had much more time

to question you. However, if you are going to make the plane—and we promised you we would try to get you out for that purpose—we are going to have to let you go now.

I have got one question that I want to ask you. I thought that I might write you a letter. If I write you a letter and it is in reference to your statement on this particular bill——

Dr. KILLIAN. I would be very happy to reply, and I would be very happy to do anything further that I can, sir, in the future to be of assistance to you and the committee.

The CHAIRMAN. I think you have been of great assistance, and we appreciate your appearance here.

If there is no objection, we will release Dr. Killian now.

Thank you again, Doctor, for being here.

The committee will now go into executive session for a moment.

(Whereupon, at 11:34 a.m., the committee proceeded into executive session.)

53283—60——26

TO AMEND THE NATIONAL AERONAUTICS AND SPACE ACT OF 1958

WEDNESDAY, MARCH 30, 1960

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND ASTRONAUTICS,
Washington, D.C.

The committee met at 10 a.m., Hon. Overton Brooks (chairman) presiding.

The CHAIRMAN. The committee will come to order.

We have two witnesses this morning; and since we also have an afternoon session scheduled, I think it would be wise to proceed immediately. I understand that our first witness, Mr. Roy Johnson, has a very fine statement. All the members have copies of the statement at their stations and they can pick them up as soon as they come in.

Mr. Roy W. Johnson, is the former Director of the Advanced Research Projects Agency of the Defense Department, popularly called ARPA.

We are very happy to have Mr. Johnson. We consider him to be an outstanding witness.

Mr. Johnson, if you would like to proceed with your prepared statement we will be very happy to hear from you, sir.

STATEMENT OF ROY W. JOHNSON, FORMER DIRECTOR OF THE ADVANCED RESEARCH PROJECTS AGENCY, DEPARTMENT OF DEFENSE

Mr. JOHNSON. Mr. Chairman and distinguished members of this committee, I welcome the invitation to appear before you. At the conclusion of this prepared statement I would like the chairman's permission to enter into the record a chronology of the Saturn project which is taken from my private notes and diary at the time I was in ARPA, and I will, with your permission, quote certain excerpts from this to illustrate the points that I have made philosophically in my prepared statement.

Since World War II, we, the American people, have wanted the quick, easy, and usually short-term and expensive answers to national security crises. These crises would never have occurred had our Nation faced up to the new technological and political conditions of our time on a continuing basis.

And it's not that we haven't spent a great deal of money, even between crises. We have been forced, by the overplayed threat of all-out war, to maintain deterrent forces of mounting costs. And

in support of deterrent forces, we have been held to high force levels in the Air Force, the Army, and the Navy.

The day-to-day approach to national security has now been overrun by technology. During the past 2 years, it has beeen my privilege to witness and to participate actively in the technological birth of a new dimension in the politico-strategic concepts of the world. We have come to the threshold of our next horizon—outer space. The unusual suddenness with which space thinking came into our lives produced another crisis.

Two things have combined, I think, to produce this new difficulty: First, we have grown complacent with our technology. Our schools proclaim the invincibility of U.S. know-how. At the same time, we have entered into a public race for the exploitation of outer space, and we have temporarily come off second best.

We should not have been so surprised. We had not done our total job, and the reasons for our failure go to the heart of the American matter. The people take international leadership for granted and complain if asked to devote more resources and planning to it.

The Congress, wrapped up in this pattern, is too often unable to assist in the attainment of optimum results in the struggle going on. Politics back home and politics abroad often collide head on, and the vote prevails.

The executive branch of the Government can work for desirable ends with restrictive limits set on means to achieve those ends. Certainly the budget has been and is large enough, but it must accommodate politics as well as national growth and security. Reorganizations must respect politics and traditions as much as management needs. The executive branch simply lacks the freedom of action required to cope with present-day problems.

The Department of Defense labors equally under the strain. Traditions in the three services are placed too high. Top defense officials are harassed by these traditions and resulting pressures. As a result, the decision-making process is continually in danger of becoming one of accommodation. Against this background the defense budget becomes the primary management tool in the Pentagon, and I think the services operate against this budget in a rather reckless fashion.

We have not aggressively planned for our future. We have been guilty of seeking to augment our own technological programs "just because the Russians may do so," and not because it is inherently the kind of thing we ought to do.

Imitation is alleged to be the sincerest form of flattery. The nation that falls into the trap of "me tooism" admits the leadership of the nation it chooses to copy. Moreover, such imitations are the result of fear—fear the product of emotionalism.

In technology, emotionalism is the first step toward failure. Under such conditions of emotionalism and crisis reaction, the consistent program, the program of continual growth, the program of steady progress, tends to get lost in a welter of starts and stops, of changes in direction, and mutually offsetting activities. And I shall illustrate this from my Saturn chronology.

There is real danger, I think, that unless the national tendency toward inconsistency can be reversed, we are going to waste a lot more money. The national unanimity of purpose so essential to defense against dynamic communism may well be permanently lost.

Past bad planning in the defense science field has already led us down a very expensive, insufficiently effective road.

Let me cite an example familiar to most of us. In 1947, the then President canceled a modest $75 million research program directed toward the development of a ballistic missile capability, primarily because cancellation was recommended by his principal scientific advisers. In defending his advice in his book, "Modern Arms and Free Men," published in 1949, Dr. Vannevar Bush made the following statement:

> We are decidedly interested in the question of whether there are soon to be high trajectory guided missiles * * * spanning thousands of miles and precisely hitting chosen targets. The question is particularly pertinent because some eminent military men, exhilarated perhaps by a short immersion in matters scientific, have publicly asserted that there are [soon to be such missiles]. We even have the exposition of missiles fired so fast that they leave the earth and proceed about it indefinitely as satellites, like the moon, for some vaguely specified military purposes. All sorts of prognostications of doom have been pulled from the Pandora's box of science, often by those whose scientific qualifications are a bit limited.

Bush went on to say that missile development costs would be astronomical; that the ICBM would never stand the test of cost analysis.

Now, this unhappy advice merely proved that scientists can be wrong. Unfortunately, advice can be most damaging when the advice giver is separated from responsibility, and I shall touch on that in my other document. In this position he merely needs to seek his own counsel, and can disregard the views of responsible line officials.

Now, during the identical time period I referred to earlier, a group of scientists within the Defense Department and, as it happens, within a division of the General Electric Co. with which I was associated, were busily engaged in the development of long-range radar equipment. Following the development of this equipment, and after the necessary international arrangements, this radar was duly installed. Its purpose: to detect the extent of Soviet endeavors in the development of intercontinental ballistic missiles. By 1953, this equipment demonstrated *unequivocably, if inaccurately* as to range and magnitude, that the Soviet Union was well along the road to the production of rocket missiles.

With the delivery of this single piece of information, the massive machinery of the U.S. Government went into emergency sessions. It not only reversed the decision made years earlier concerning a missile research effort, but undertook immediately to produce in quantity a multibillion-dollar family of competing missiles—each of them, and all of them, on an emergency crash basis. As Secretary Don Quarles noted at the time, this effort was based not upon the products of our own research know-how, but on the crisis-born philosophy that what the Russians were going to do we should do better.

Primarily because of pressure, both public and private, many of the missiles were committed to production without mature judgment as to their adequacy for the mission intended, and, indeed, often without mature judgment as to their absolute necessity in terms of the U.S. strategic posture. We are still engaged in this program, and the problems associated with the emergency nature of the action have plagued our top defense and administration officials almost daily for 5 years.

How much better it would have been in 1947 to have continued an aggressive program of research on a level consistent with reasonable progress. Our approach to the problem led to the most expensive expression of interservice rivalry the Nation has known. A decision for missile research in 1947 might have forestalled the separation of Army and Air Force that occurred in the DOD Organization Act of that time. As the Holifield committee has pointed out, these services were separated at the very time a weapon arrived to dictate their continued unity.

The introduction of space requirements in our Federal budget requires that we make much better use of our funds. To do so, we are going to have to do a better job with our historical problem of organizing and directing technological progress. In many respects, this is the root of our struggle against communism. Khrushchev now says that the dynamics of the U.S.S.R. and the United States are such that the 42-year-old land of the Soviets is already able to challenge the 150-year-old capitalist state to economic competition; and the most farsighted American leaders are admitting that the Soviet Union is catching up and might ultimately outstrip us.

Mr. Khrushchev has the benefit of a planned economy. We do not have to accept the obvious failings inherent in a planned economy to make better use of our money.

Since World War II, and even in the context of expensive missile development from 1954 to 1960, we have been rich enough and captive of our politics and traditions enough to put many varied and duplicating weapons into development and production. In the process we have sought to overcome our basic research shortcomings and buy time at great price and effort by resorting to the so-called weapons system approach to research and development. In this brute force approach, lack of planning and mistakes are simply bulldozed under by more manpower and by more money. However, today we are no longer rich enough to continue these wasteful practices.

It is widely admitted that the Federal budget must remain close to its present annual level for the near future. In the absence of a revised congressional attitude toward public works, agricultural subsidies, and veterans' benefits, the defense portion of the budget, roughly $41 or $42 billion annually, I suppose must stay essentially the same.

If we are no longer rich enough to have all, what do we do? How do we adequately provide for the continuous basic and advanced research which must grow with accelerating technology? How do we provide for military weapons development and procurement in the new environment of space, since presumably our land, sea, and air missions will remain with us?

For the past 2 years the agency I created has planned and managed research for military space and technology and ballistic missile defense. Our work has led to the realization that systems in these areas involve astronomical costs. Frankly, maneuverable recoverable space vehicles for strategic purposes and an effective ballistic missile defense system alone could eat up the entire defense budget.

Against this background I appear today to admonish this committee and the others of the Congress not to be too preoccupied with reorganizations, but to continue to concern themselves with programs, goals, and all-out defense against communism.

So I believe that no changes in the space laws are necessary. I believe modifications of the present organization structure could be made to make it more effective, and I would be happy to answer questions in this respect.

Secondly, I believe there is one fairly sinister development which you could help, perhaps, to overcome. There is a widespread, almost emotional movement to declare space, like Antarctica, a peaceful place. This is as hopeless of being effective as declaring the ground, the air, or the water exclusively peaceful.

Thirdly, I suggest that the Congress should not blindly accept all of the advice from eminent scientists. Many of these competent men of science are not competent to advise our country in matters of national security, policymaking, or general management. As an example, I believe we lag in the missile and space fields because of bad advice given over the past dozen years.

Fourth, I suggest you keep the civilian leaders of the Pentagon forever alert to the dangers of Russia using the space environment to gain military superiority over the United States. Specifically, I would keep asking what our country is doing to meet the potential threat, recently brought into the open by the British, not by the United States, although we have known of this for years, of nuclear warheads being stored in orbiting satellites that can be brought to Earth by command. What are our plans to accomplish this as a follow-on to the intercontinental ballistic missile. Today some civilian scientists, as in 1947, are poo-pooing this, saying it is ridiculous.

Finally, I would suggest that this committee continue to be the watchdogs over the Saturn space vehicle. This continues to be our big and by far the most important space program for the defense of our country. It will give us the potential to meet Russia in space weapons delivery. Anything more I would say on this matter is classified, but I plead with all my heart and head that you not permit this Saturn vehicle to lag for the want of money, management, direction, or military support.

I would like now to read excerpts from the chronology of Saturn, taken from my diary, which will illustrate in this Saturn project which, I repeat, I think is the most important space project we have and tend to confirm some of these statements that I have made philosophically in this paper.

I would also appreciate to have the whole chronology in the record, although I won't read it all.

The CHAIRMAN. How long is it?

Mr. JOHNSON. Sixteen typewritten pages.

Mr. FULTON. I move that be done.

The CHAIRMAN. That will be done, without objection.

(The Saturn chronology is as follows:)

In June and July 1958, Mr. D. A. Young, Mr. R. Canright, and others who were members of the IDA staff, began discussing an idea about a large booster with other members of the ARPA and IDA staff. Their conception of this large booster included the clustering of seven to nine available engines that would provide a booster of some 1.5 million pounds thrust. They felt that the IRBM-type engine would be the most appropriate for the booster because it could be used with minimum modification and cost and offered maximum early reliability.

Initial military application of this booster would be placing a communications satellite in 24-hour orbit.

After receiving an informal "go ahead" on this idea from Mr. Johnson, Mr. Young called Dr. W. von Braun at ABMA to discuss the 1.5-million-pound booster concept. Shortly thereafter, on August 7, 1958, Mr. Young and others visited Huntsville to carry forward further talks about the project with Dr. von Braun, General Medaris, and others at ABMA. Initially, the official family at ABMA showed only lukewarm interest in the project because the ARPA representatives stated that funds for this new project would be taken from the $46 million that ARPA had indicated would be allocated to the Juno IV project. ABMA had sought funds for the Juno IV project since May 20, 1958, and the ARPA order to initiate the project had not yet been issued. Juno IV would have provided boosters for meteorological, communication, and navigational satellites. However, upon being assured that the reduction in funds for Juno IV would be temporary in nature, the ABMA attitude changed markedly.

Dr. von Braun presented the results of an ABMA study at this time which visualized the use of a cluster of four 380-K-pound-thrust engines that were being developed by Rocketdyne. These engines in cluster would provide approximately the same thrust as the eight IRBM-type engines, but were still in the development stage. He liked the eight-engine cluster, however, because one engine could cut out and a mission could still be flown and accomplished.

On August 14, 1958, as a result of the visit by Mr. Young and others of ARPA, AOMC requested, by TWX, immediate authority to proceed on the 1.5-million-pound-thrust booster. ABMA requested $10.5 million for initiation of the project in this TWX.

After review within ARPA, Mr. Johnson decided that he would apply money from the $46 million previously designated for Juno IV to the new project. Mr. Johnson signed ARPA order 14–59 on August 15, 1958, directing the development of the large space vehicle booster along with ARPA orders 15 and 16, which ordered the Juno IV development under a concept of reduced funding. Five million dollars was made available under ARPA order 14–59, with a request for a development and funding program from ABMA had a demonstration of a full-scale captive firing by the end of calendar year 1959. The funding level approved by ARPA on August 31, 1958, extended the funding level to $15 million, of which the initial $5 million made available was a part.

In September 1958, after a visit by Dr. Glennan and others to ABMA, various stories circulated around Washington that ABMA had briefed visitors, including Dr. Glennan, on a cost analysis visualizing the firing of 100 Juno V vehicles. (Juno V was the initial designation for the Saturn project.) An analysis of this type is necessary to determine overall average vehicle costs. However, Mr. Johnson was disturbed upon hearing this because the number of vehicles involved and the funding was far out of proportion to the concept he had in mind at the beginning of this program. He was also much concerned that figures of this magnitude might be presented in the NASC and result in killing the program before it really had a chance to get underway.

As a result of this concern, Mr. Johnson invited General Medaris and supporting personnel to a meeting in his office on September 23,

1958. This meeting was to definitively outline the program, particularly in view of the Space Council meeting the next day, so that everyone would be more more completely aware of the initial scope intended. In a joint memorandum signed by Mr. Johnson and General Medaris, the same day, agreement was reached on $13.4 million as a funding level for fiscal year 1959 and $20.3 million in fiscal year 1960. It was agreed that initially the program would include a static firing and four test flights of the first stage. In addition, $1.6 million in fiscal year 1959 was agreed on as a reasonable sum for the modification of ABMA's static test stand to captive-fire the clustered booster and $7 million was estimated for the launch facilities to be built at the Atlantic Missile Range. This meeting lasted 2 hours, which explains the resulting roughness of several of these figures as will be later pointed out. It should be noted also that these figures did not include anything for upper stages and any vehicles beyond the four boosters. Copies of this paper were immediately transmitted to Dr. Glennan and Dr. Killian.

On October 10, 1958, ABMA formally requested the $1,642,000 for construction modification to their test stand to handle the 1.5-million-pound booster engine static test firings. In requesting apportionment from BOB on October 21, 1958, of these funds, ARPA was informally advised that this request would not be approved until the Juno V (Saturn) project was clarified as to scope and responsible agency. During this time ABMA submitted to ARPA a development and funding plan in accordance with ARPA Order 14–59. ARPA's first draft of the fiscal year 1960 budget included $40 million for the clustered booster and $14 million for its guidance system.

During the month of October 1958, Mr. Johnson was advised by some of his staff that the Discoverer program could be curtailed in the number of firings resulting in excess boosters which could provide substantially the same payload in orbit as the Juno IV program. These boosters were represented to him to cost a total of approximately $1⅓ million each, which was substantially cheaper than the Juno IV vehicles being developed at ABMA. As a result of this apparent availability of Discoverer type vehicles for communication, navigation, and meteorological payloads, Mr. Johnson directed that the Juno IV program be canceled, and a maximum recovery made of unexpended funds already allocated to ABMA. It was expected that recovered funds could be used to substantially augment Juno V (Saturn).

General Medaris visited Mr. Johnson a few days later and at this time Mr. Johnson indicated that he would like to transfer some of the funds, salvaged from Juno IV, to the Juno V (Saturn) program for upper stage studies, additional component testing, and some long leadtime hardware. Shortly thereafter Mr. Canright, Colonel Thomas, and Mr. Young visited ABMA with a guideline of $8 million provided for program expansion by Mr. Johnson in order to determine if this amount would cover the augmentation. Determining this amount to be inadequate for the planned augmentation, ABMA was requested to provide development and funding plans at various levels. ABMA replied with two funding plans, one at the $17 million level and the other at approximately $11 million. After review by ARPA the scope of the $11 million plan, which provided

the aforementioned upper stage studies, component testing, and so forth, plus provision for a nonflyable "Battleship" first-stage booster was approved and funded in the amount of $8 million. ABMA was informed verbally at this time that an attempt would be made to provide $3.4 million for long leadtime items and that the two figures together would provide the funding of the $11 million plan, the lowest of the two which had been submitted.

During the week of November 13, 1958, preliminary reviews of the ARPA–NASA space budgets were conducted. On November 13, 1958, Dr. Killian, Mr. Quarles, Dr. Glennan, Dr. Dryden, Dr. York, Mr. Silverstein, Mr. D. A. Young, Mr. L. Gise, and Mr. R. O. Piland met to seek any possible modifications to the space budget. The memorandum resulting from this meeting proposed the effective cancellation of the Juno V (Saturn) project by deleting all funds that ARPA had proposed for the project. At this time, a question was raised whether the project responsibility should be transferred to NASA. This transfer was opposed by ARPA and was not urged by Dr. Glennan and thereafter the issue was left dormant.

On November 19, 1958, the Secretary and Deputy Secretary of Defense agreed on inclusion of $40 million and an additional $10 million for systems engineering (guidance) for the clustered booster project in the fiscal year 1960 DOD budget, subject to further discussions with the President's scientific advisor and Bureau of the Budget. Following this the Deputy Secretary of Defense and members of ARPA's and NASA's staff reviewed the space budgets with members of the Bureau of the Budget and Dr. Killian and agreed on $50 million for the clustered booster in fiscal year 1960. No further decision was made, however, as to whether NASA or DOD should be assigned the project.

On November 21, 1958, amendment No. 2 to ARPA order 14 approved ABMA's development and funding plan and increased the fund availability to $13 million to carry out agreements under the memorandum of understanding. In a letter to the Deputy Secretary of Defense dated November 21, 1958, Mr. Johnson requested concurrence in the clustered booster schedule in order to assist getting funds released from BOB for ABMA's static test stand. On this date ABMA also supplied supplement No. 1 to their development and funding plan which requested fiscal 1959 funds be increased to $32,875,000 for the clustered booster on the basis of the changed program objectives from a feasibility demonstration to that of a workable and reliable multistage vehicle system. The revised plan called for five boosters: one used for static testing and four flight tests. This revision would increase fiscal year 1960 funding requirements to $60 million.

The following day, November 22, 1958, Mr. Quarles, Deputy Secretary of Defense, reserved concurrence on Mr. Johnson's letter of November 21, until the fiscal year 1960 budget was clarified. On November 25, 1958, Mr. Johnson in a memo to the Secretary of Defense, urged the retention of the clustered booster in the DOD's budget rather than NASA's.

On December 2, 1958, Deputy Secretary of Defense Quarles advised Mr. Johnson, by telephone, that the DOD budget for fiscal year 1960 would contain $50 million for the clustered booster. Shortly thereafter BOB apportioned funds for modification of the static test stand for the clustered booster.

On December 9, 1958, ABMA requested DX priority rating for the clustered booster. In a memorandum to Mr. L. Gise, Colonel Thomas suggested that ARPA initiate this action as well justified. Mr. Johnson sent a letter to the Secretary of Defense requesting this rating which received a nonconcurrence from Mr. Holaday, Director of Guided Missiles, because of possible impact on missile schedules. (Note: The lack of a DX priority rating has not hurt the Saturn program as of November 1, 1959. However, it is felt presently that should the steel strike continue, this priority would be mandatory if Saturn schedules are to be met.)

ARPA order 47–59, dated December 11, 1958, provided AOMC with funds in the amount of $1,892,000 for modification of the ABMA static test tower. Of this amount, $250,000 was earmarked for studies of the launch facilities for the 1.5-million-pound thrust booster to be located at the AMR, Cape Canaveral, Fla.

On December 18, 1958, amendment No. 3 to ARPA order 14 approved supplement No. 1 to ABMA's development and funding plan and provided an additional $8 million, bringing fiscal year 1959 total funding for the clustered booster to date to $23 million ($21,108,000 under ARPA order No. 14–59 and $1,892,000 under ARPA order No. 47–59).

Amendment No. 3 also requested a 4-month system study to investigate various approaches to upper stages for the large booster to provide a multistage carrier vehicle. The President's fiscal year 1960 (ARPA) budget completed in December 1958 contained $50 million in estimated funds for the clustered engine booster.

In January 1959, Mr. Canright and Colonel Thomas visited the AMR for meetings concerning the selection of the site for Saturn launch facilities. During this meeting, and confirmed by subsequent actions in Washington, it was determined that the unfinished Titan complex No. 20 originally proposed for modification to be a Juno V launch facility was no longer available due to requirements for its completion and use by the Titan program. As a result, the estimate for initial construction of Juno V launch facilities was revised upward from $7.6 million to $8.6 million in order to provide for the blockhouse which would have been available if the Titan site could have been used.

On February 2, 1959, the Department of Army proposed, in a letter to Mr. Johnson, to rename the project from Juno V to Saturn. Justification was that Saturn was the next star after Jupiter and that the name was consistent with the Army policy of naming its major vehicles after ancient gods. Mr. Johnson approved this action on February 3, 1959, in a letter to the Director of Army Research and Development.

On February 13, 1959, General Medaris submitted which delineated budget requirements for the Saturn program if the proposed schedule was to be met. This schedule called for captive dynamic firing by December 1959 and the first flight test of the first stage booster by October 1960. He pointed out that upper stage development work would provide live second stages on flights 3 and 4, would provide the preliminary work to put a live Centaur stage on the fifth flight, and provide engineering payloads on flights 3 and 4. The budget estimates included increased in the fiscal year 1959 and 1960 funds

and preliminary figures on the fiscal year 1961 estimates. The recommendations included two alternatives: (1) A total program of $154.7 million ($38.3, $75.2, and $41.1 million in fiscal years 1959, 1960, and 1961 respectively) over the 3 years for a deadend four vehicle program including second stages and payloads for flights 3 and 4 and (2) extension of the Saturn project to a 16-vehicle program including multistage vehicle development requiring additional funds of $5.2, $52.2, and $86.9 million in fiscal year's 1959, 1960, and 1961 respectively.

On March 17, 1959, General Medaris' staff at ABMA presented a Saturn systems study per ARPA order 14–59. Following this presentation at which representatives of the three services—DGM, OSO, and NASA—were present, Mr. Johnson established an ad hoc committee to review the AOMC systems study with a view toward recommending the upper stages to be selected. General Medaris requested, by letter, that Mr. Johnson expedite the decisions of the ad hoc committee on March 25, 1959. He was concerned that committee action was too slow for the decisions that were necessary regarding the Saturn program.

During April 1959, Mr. Johnson's ad hoc committee studied upper stages for the Saturn project. Among the vehicles considered were Atlas, Titan (one engine), and Titan (two engine). In a memorandum dated May 19, 1959, for the Director ARPA, this committee recommended the two-engine Titan for the second stage. DOD members recommended Centaur for the third stage for NASA's missions using Saturn. Mr. Johnson approved the recommendations of the committee and a memo was forwarded to General Medaris at AOMC.

On April 24 Mr. Johnson signed ARPA order 47–59, amendment No. 1, which increased funds for the construction of launch and test facilities to $9,492,000. On April 28, 1959, Mr. Johnson signed amendment No. 5 to ARPA order 14–59 increasing Saturn fund availability to $24,508,000. The increase was the $3.4 million that Mr. Johnson had promised General Medaris previously if any funds could be procured.

In a letter dated April 13, 1959, to the Director, ARPA, Mr. R. E. Horner, Assistant Secretary of the Air Force for R. & D. suggested the military applications for Saturn as devised by a BMD/STL study. In this letter Mr. Horner also suggested a management concept for Saturn which gave the Air Force project responsibility.

During May 1959, the major decision made by ARPA, insofar as the Saturn program was concerned, was the one on the second stage configuration mentioned earlier. On May 22, 1959, General Medaris again requested a DX priority rating for the Saturn program. On May 26, 1959, in response to Air Force concern that Saturn project might interfere with Air Force projects at Martin/Denver, ARPA informed AOMC that it was mandatory for all contractor negotiations with the Martin Co. pertaining to upper stages be fully coordinated with appropriate Air Force agencies.

During the month of June 1959, the fiscal year 1961 budget estimates were developed. DOD recommended $110 million for fiscal year 1960 and $250 million for fiscal year 1961 for a 16-vehicle Saturn program. As a result of the Director's, ARPA, review of the budget

and that of the program council, Saturn was established at $80 million in fiscal year 1960. Part of this $80 million, $10 million, was for the ARPA Director's reserve. The fiscal year 1961 budget was placed in two schedules, plan A recommended a fiscal year 1961 budget of $130 million and plan B recommended $250 million.

In June the problem of contractual relationships emerged again. General Barclay, of ABMA, met with General Ritland, of AFBMD, to discuss procurement of second stage hardware and services from Martin, Denver. ABMA proposed direct contracting by ABMA with Martin, Denver, with safeguards to prevent interference with Air Force programs. General Ritland made a counterproposal on July 20, 1959, that required procurement and technical requirements be channeled through BMD–BMC. BMD would then be responsible for systems engineering of the second stage. General Barclay replied on the same date pointing out requirements not met by the BMD counterproposal and repeated the need for direct contractual arrangements. He again assured General Ritland of noninterference with Air Force programs by establishing many points of contact and coordination implementation.

This issue remained in doubt with little compromise on either side until ARPA order 14–60, amendment No. 7 delineated the responsibility for Saturn system development to AOMC. This order dated July 9, 1959, also authorized the AOMC to enter into direct contracts with appropriate contractors and covered the area of AOMC–ABMA coordination with AFBMD–BMC thoroughly.

On June 9, 1959, in a memo to Mr. Johnson, Dr. York, now Director of Defense Research and Engineering, approved the $5.5 million requested for the Centaur guidance, but refused granting the $6 million to the Saturn project. Dr. York stated his case against Saturn:

> In the Saturn case, I consider that there are other more urgent cases requiring support from the limited amount of the emergency fund which remains uncommitted. Accordingly, if further reprograming within funds now available to ARPA is impracticable some slippage must be accepted.

On July 27, 1959, Dr. York, in a memo to the Secretary of the Air Force and Director, ARPA, requested that these agencies jointly study the possibility of a common development for the second stage of the Saturn and the booster for Dynasoar. Dr. York was at least partially convinced by the Air Force that the Titan C configuration proposed for Dynasoar would: (1) Provide an optimum booster for Dynasoar, and (2) satisfy the currently identifiable space booster requirements of the DOD.

The views of Dr. Kistiakowsky, Ralph Clark, and others that the military communications requirements of the Defense Department could better be satisfied by the launching of a substantial series of smaller 24-hour vehicles convinced Dr. York that Saturn, per se, was not required by the Defense Department for the accommodation of its military requirements. Saturn has been primarily defended since the establishment of NASA as a military vehicle required for the communications mission.

Dr. York has never concurred with the proposition that Saturn is necessary because he does not believe space platforms and Mrs. V. have military applications.

On the basis of his preliminary analysis, and after a stated discussion with the Secretary of Defense, Dr. York advised Mr. Johnson as follows:

I have decided to cancel the Saturn program on the grounds that there is no military justification therefor, on the grounds that any military requirement can be accommodated by Titan C as proposed by the Air Force, and on the ground that by the cancellation the Defense Department will be in a position to terminate the costly operation being conducted at ABMA.

In response to an informal question from Dr. York, Mr. Johnson stated that if the facts that (1) Titan C could accomplish the military missions contained in the 10-year plan; (2) that the Titan C could, in fact, be constructed at something like 75 percent of the cost of developing Saturn, he, Mr. Johnson, would of course be forced to concur.

Immediately after this conversation Mr. Johnson reviewed this discussion with his staff and prepared a letter to the Secretary of Defense confirming his feeling that if Dr. York's facts were correct he could not oppose the cancellation of Saturn. Another letter was prepared by Mr. Johnson proposing Saturn and ABMA be transferred to the Air Force.

On September 16, 17, and 18, 1959, a committee was appointed by Dr. York and convened to review the three planned big boosters: Titan C, Saturn, and Nova.

York and Dryden, cochairmen.

Silverstein and Horner, NASA.

Morse, Army.

Charyk, Air Force.

Mr. Canright and Mr. House of ARPA made presentations as did Mr. Hardeman of ABMA.

On the basis of the ARPA presentations, Dr. York finally agreed to the continuation of Saturn. The decision to keep Saturn, however, did not imply a decision on Dynasoar. Neither did the decision meet the Secretary of Defense's desire to relieve the Army of further participation in the "big rocket program," which produced an uneconomic drain against the Army's dollar budget.

Following these events, Dr. York began negotiations with the Administrator, NASA, designed to obtain agreement by that agency to the transfer of AMBA and, therefore, Saturn to NASA.

Here again the problem of military requirements is relevant. During these discussions with NASA, at the White House, and in the Secretary of Defense's Office, Dr. York repeatedly stated it as his view that this transfer should be effected only with a firm guarantee by the President as to a supplemental funding level for the Saturn vehicle.

During a discussion aboard an aircraft returning from Grand Rapids, Mich., Mr. Johnson and the Deputy Secretary discussed this program in detail. Johnson insisted that there were military requirements. Mr. Gates agreed that York's position was somewhat ambiguous because of the conflict between the statement that there were no military requirements for the vehicle and continued insistence that the transfer could be effected only with a Presidential guarantee to DOD of augmented funding for Saturn.

When Dr. York had initially questioned the second stage development of Saturn in July 1959, ARPA suspended all work on the Titan second stage that had been planned for. This suspension is still in effect and ARPA initiated study by ABMA of optimized upper

stages for Saturn on September 23, 1959. ABMA study results were presented to Dr. Glennan, Mr. Johnson, Mr. Holaday, Dr. Dryden, General Boushey, Mr. Horner, and others on October 29, 1959.

Funds have been made available to ABMA for fiscal year 1960 on a monthly basis since July 1, 1959. Total funds made available to date are $69,163,267—$59,671,267 has been made available under ARPA Order 14 for operations and $9,492,000 under ARPA Order 47 for construction facilities related to Saturn.

Mr. JOHNSON. The first part of the chronology I would like to refer to—first, I would like to go back and say ARPA was created, as you know, in February of 1958, and the chronology starts with the statement that in the months of June and July members of the ARPA staff put together the need for a clustered engine, which eventually became Saturn, and that the money was first appropriated or made available to the Saturn project in August.

Now on the 10th of October of 1958, ABMA formally requested that they receive $1,642,000 for construction modification to their test stand to handle the 1½-million-pound thrust booster Saturn for static test firing. In requesting apportionment from the Bureau of the Budget on the 21st of October of 1958, ARPA was informally advised that this request would not be approved until the Saturn project was clarified as to scope and responsible agency.

Mr. HECHLER. Excuse me, was that by the Bureau of the Budget?

Mr. JOHNSON. Yes. I will refer then to when this approval was given, in a moment.

The CHAIRMAN. Read that statement again, if you don't mind.

Mr. JOHNSON. On the 10th of October, ABMA formally requested that $1,642,000 for construction and modification of their test stand to handle the 1.5-million-pound booster engine static test firings. ARPA, in requesting apportionment from the Bureau of the Budget on October 21, 1958, of these funds, ARPA was informally advised that this request would not be approved until the Juno V—Saturn—project was clarified as to scope and responsible agency.

Now I will come back to that in a moment.

During the week of November 13, preliminary reviews of the ARPA–NASA budgets were conducted. On November 13, Dr. Killian, Mr. Quarles, Dr. Glennan, Dr. Dryden, Dr. York, Dr. Silverstein, Mr. Young of ARPA, Mr. Gise of ARPA, and Mr. Piland of the Space Council met to seek any possible modifications to the space budget.

The memorandum resulting from this meeting proposed the effective cancellation of the Saturn project by deleting all funds that ARPA had proposed for the budget.

At this time the question was raised whether the project responsibility should be transferred to NASA. The transfer was opposed by ARPA and was not urged by Dr. Glennan and thereafter the issue was left dormant. On the 19th of November the Secretary and Deputy Secretary of Defense agreed on inclusion of $40 million and an additional $10 million for systems engineering—guidance—for the clustered booster project in the fiscal year 1960 DOD budget, subject to further discussions with the President's scientific adviser and the Bureau of the Budget

On December 2, Deputy Secretary of Defense Quarles advised Mr. Johnson by telephone that the DOD budget for 1960 would contain

$50 million for the clustered booster. Shortly thereafter the Bureau of the Budget apportioned funds for the modification of the test stand for the clustered booster. So we got approval from the Bureau of the Budget, we requested it on June 10, and finally got approval on December 2 from the Bureau of the Budget.

On the 9th of December, ABMA—this is 1958, all in 1958—ABMA requested a DX priority rating for the cluster booster.

Mr. FULTON. A what?

Mr. JOHNSON. DX rating, that is the highest rating, same rating as all other missiles.

The CHAIRMAN. December what?

Mr. JOHNSON. December 9. In a memorandum to Mr. Gise of my staff, Colonel Thomas of my staff suggested that ARPA initiate the action because it was justified. Mr. Johnson sent a letter to the Secretary of Defense requesting this rating, which received a nonrecurrence from Mr. Holaday, who was Director of the guided missiles, because of possible impact on missile schedules.

Now I want to say this, however, that by sweat, blood, and tears, the lack of DX priority rating to my knowledge has not hurt the Saturn program as of that date, and I am not so sure, and I can't prove that it has hurt the project materially. You would have to ask other people who are managing the program more intimately today.

On May 22d of 1959, General Medaris again requested a DX priority rating for the Saturn project. It was not given.

In June, the problem of contractual relationships emerged again. General Barclay, of ABMA, met with General Ritland of AFBMD to discuss procurement of second stage hardware and services from Martin, Denver. ABMA proposed direct contracting by ABMA with Martin, Denver, with safeguards to prevent interference with the Air Force programs. General Ritland made a counterproposal on the 20th of July that required procurement and technical requirements to be channeled through BMD–BMC. BMD would then be responsible for systems engineering of the second stage.

General Barclay replied on the same date, pointing out requirements not met by the BMD counterproposal, and repeated the need for direct contractual arrangements. He again assured General Ritland of noninterference with Air Force programs by establishing many points of contact and coordination implementation.

The issue remained in doubt with little compromise on either side until ARPA Order 14–60, amendment 7, which delineated the responsibility for the Saturn system development to AOMC. This order, dated July 1959, also authorized AOMC to enter into direct contracts with appropriate contractors, and covered the area of AOMC–ABMA coordination with the ballistic missiles division in California.

Now in July of 1959, in a memo to Mr. Johnson, Dr. York, who is now Director of Research and Engineering, approved my request for a $5.5 million request for the Centaur guidance, but refused granting the $6 million to the Saturn project. Dr. York stated his case against Saturn:

> In the Saturn case, I consider that there are other more urgent cases requiring support from the limited amount of the emergency fund which remains uncommitted. Accordingly, if further reprograming within funds now available to ARPA is impracticable some slippage must be accepted.

Now a little later the views of Dr. Kistiakowsky, Ralph Clark, and others that the military communications requirements of the Defense Department could better be satisfied by the launching of a substantial series of smaller 24-hour vehicles, convinced Dr. York that Saturn, per se, was not required by the Defense Department for the accommodation of its military requirements. Saturn has been primarily defended since the establishment of NASA as a military vehicle required for the communications mission.

Dr. York has never concurred with the proposition that Saturn is necessary because he does not believe space platforms and Mrs. V have military applications.

On the basis of his preliminary analysis, and after a stated discussion with the Secretary of Defense, Dr. York advised Mr. Johnson as follows:

I have decided to cancel the Saturn program on the grounds that there is no military justification therefor, on the grounds that any military requirement can be accommodated by Titan C as proposed by the Air Force, and on the ground that by the cancellation the Defense Department will be in a position to terminate the costly operation being conducted at ABMA.

Mr. QUIGLEY. Mr. Johnson, when was that—the date, again?

Mr. JOHNSON. This was in August.

Mr. QUIGLEY. Of last year?

Mr. JOHNSON. Of last year.

The CHAIRMAN. That is Dr. York, who is up there now in charge of that program?

Mr. JOHNSON. That is right.

Now I parenthetically should say that part of this came about by the Air Force urging that the Titan program could be grown into a million-pound thrust, and that the larger Titan, the modified Titan, could do the things that Saturn was doing, and could be constructed at a lower cost.

We had many committee meetings, and on the—let's see, let me read some more of the notes here—yes, the Air Force said that the Titan C could in fact be constructed at something like 75 percent of the cost of developing the Saturn. I said, of course, if it costs less, we can get it quicker, I will go along with it.

On the 16th, 17th, and 18th of September 1959, a committee was appointed by Dr. York and convened to review the three planned big boosters: Titan C, Saturn, and Nova. York and Dryden were co-chairmen, Silverstein and Horner, NASA; Morse, Army; Charyk, Air Force; Mr. Canright and Mr. House of ARPA made presentations as did Mr. Hardeman of ABMA. And after days and weeks of preparation on the basis of these presentations Dr. York finally agreed to the continuation of Saturn. And it was shortly after that that negotiations were undertaken with the Administrator of NASA to transfer Saturn to NASA, because frankly the Department of Defense couldn't afford it.

Well, the rest of the record is in the chronology.

The CHAIRMAN. Well, it will be spread upon the records, anyway, of this committee.

Is that your statement?

Mr. JOHNSON. That is my statement; yes, sir.

The CHAIRMAN. Well, Mr. Johnson, you have certainly fired both barrels, to put it mildly. You have given us quite a surprise.

So there won't be any confusion at all in my mind, did I understand you to say that Dr. York recommended the cancellation of the big booster program?

Mr. JOHNSON. He recommended the cancellation of the Saturn program.

The CHAIRMAN. Saturn, well, that is our big booster program.

Mr. JOHNSON. I think he had in mind other boosters.

Mr. FULTON. Titan C.

Mr. JOHNSON. Titan C.

The CHAIRMAN. Titan C is not developed?

Mr. JOHNSON. Titan C was abandoned after this examination.

The CHAIRMAN. Abandoned, yes, in favor of Saturn.

Mr. JOHNSON. Mr. Chairman, I would like to say that the purpose of this chronology was to show that even in an important project, which I believe to be of a high military significance, a project like Saturn had stops and go's; we are doing this even today. We are stopping and going. This is not something that was only true back in the forties, in the big missile program; it is true today. The stop and go is the thing I deplore.

The CHAIRMAN. Well, yes. I think that this committee and the public generally throughout the country are sold on the thought that we should develop a big booster to overtake Russia. Despite that, we seem to have a lot of forward and backward play going on. Some want to cancel, some want to discard what we now have and pick up another project. Valuable time is being lost, it seems to me, which should be put in the development of the Saturn project; isn't that true?

Mr. JOHNSON. I agree, sir.

The CHAIRMAN. Wasn't it rather discouraging to you in your position as head of ARPA to have all of that time lost?

Mr. JOHNSON. Yes, Mr. Chairman, it was very discouraging because I believe so strongly in Saturn and I believe even now the military departments, including the Air Force, are not fully aware of the importance that Saturn is going to play 10 years hence in our total military posture.

The CHAIRMAN. I have heard some say it is not a military need at the present time, but I think the people that make that statement are wearing nearsighted glasses. They are not looking into the long-range future of the development; isn't that true?

Mr. JOHNSON. Mr. Chairman, I agree completely. In my summary of the 20 months in the Pentagon, I indicate my belief that we have some excellent military planners who are assuring us that we could win today's war, the war of next year, and maybe the war 2 years hence. But I am deeply concerned about our unwillingness to face up to a war that may have to be fought 5, 10, 15 years from now.

The CHAIRMAN. And it seems to me there is another thing that your statements indicate: the fact that money is the controlling feature here. Isn't that right?

Mr. JOHNSON. The budget has become the chief management tool within the Pentagon.

The CHAIRMAN. That is a severe indictment of our national defense. Since the Defense Department couldn't budget for the Saturn program, it has been given to NASA—and that is all right with me,

I am not against that—but to give it to NASA for the reason that they don't have the money for it, but NASA can get the money, reveals that it is money that is controlling the development of the space program, isn't that right?

Mr. JOHNSON. Mr. Chairman, I sat through several meetings where the Secretaries of Defense and the miltary departments and the Joint Chiefs were present. This problem was discussed, and this, I think, was the concensus.

The CHAIRMAN. Mr. Johnson, you are a dedicated man, a loyal American, you want to see our country safe, sound, well protected. Do you now think that ARPA and the Defense Department and those in authority, like Dr. York, are thoroughly sold, even at this hour upon the emergency of this program of space development?

Mr. JOHNSON. No, Mr. Chairman. I feel that the urgency of getting on with the spending of more money in technology of all kinds, including space technology for military defense, is not proceeding as rapidly as it should for lack of money.

The CHAIRMAN. Lack of money. Well, that is due to the lack of a sense of urgency, isn't it? If those officials in high positions felt that this was an urgent program, don't you think it would be treated more in the nature, not of a crash program, but of an urgent program?

Mr. JOHNSON. Mr. Chairman, I think it comes back to a fundamental problem of the way we think. We are too short-term in our planning. Our planners are convinced, and I am convinced, that we can defend ourselves against Russia, today, tomorrow, and next year, and therefore money goes to those projects that lend themselves to more closely timed potential wars. I don't think we have the proper sense of urgency in planning for our future defense posture, 5 to 10, 20 years from now. We have two kinds of urgency as I see it.

The CHAIRMAN. I am reminded by my colleague Mr. Fulton, that I have exceeded my time. I have a little bit.

Mr. FULTON. I just wanted you to know there were 10 minutes consumed.

The CHAIRMAN. I didn't consume 10 minutes. Nonetheless you are recognized.

Mr. FULTON. There seems to be a difference of opinion. I would say from 28 of until 18 of is 10 minutes. I was called for 8 minutes on the gavel. Somebody keep the time on me for 3 minutes.

You had spoken of the fact that the test stand money was not given for the Saturn program at a certain time. I was down there at ABMA later than the time you spoke about, and it didn't look to me as if there was any delay on the Saturn program through failure of money on the test stands, as such. I heard nobody speak of that as a reason for delay. Of course, I did hear that they wanted money. I have never been to a military installation that didn't want more money.

Do you think that that did delay the program?

Mr. JOHNSON. Well, I am not sure. I am not sure that Saturn program has been delayed inordinately by these actions.

Mr. FULTON. The next——

Mr. JOHNSON. But I would like to say this, Congressman Fulton, it is only because a group of dedicated people circumvented the rules that these things got done. I think we did spend the money in spite

of the Bureau of the Budget putting a stop on it, because we transferred other funds.

Mr. FULTON. I might say for the record I have always admired Roy Johnson of ARPA, and the pressure he put on to get these jobs done every time he came before our committee. It was refreshing to have someone really pushing. I would like that on the record.

I admire you very much. The other point is this: Money has always been a limiting factor in the Department of Defense, even when it was $13 billion being spent in the late 1940's for defense, when they thought we couldn't spend any more. For example, just prior to the Korean war, when there was the tremendous fuss regarding the Department of Defense budget on whether to enlarge the Air Force from 48 to 70 groups. Then it was President Truman and Mr. Symington, as head of the Air Force, who decided that for budgetary reasons alone the Air Force could not be increased, even in spite of the danger which then existed, of the Korean war.

Now, there is really no change under any administration. The Bureau of the Budget puts limits on certain programs and tries to prevent duplication, isn't that right?

Mr. JOHNSON. Mr. Fulton, I am not complaining against any administration. I am still a Republican, let's get that straight. [Laughter.]

I haven't changed my political——

Mr. FULTON. Then the same complaint can be made against the Truman administration, too?

Mr. JOHNSON. The complaint I am making is the complaint against our system, and I think our system needs reworking.

Mr. FULTON. I have only half a minute. The next point is this: When there are competing systems such as Titan C and Saturn, rather than agree with the chairman that it was a waste of time for people of energy and ability and scientific know-how to get together and make the long-run decision after the evidence was in and a due hearing and a committee being set up. I think that is the proper way. As I said before, I was on the aircraft scheduling unit in World War II, scheduling planes for the U.S. Army, and then the Air Force, and the Navy, and the British, and there were many discussions—I was their representative in the Navy—there were many discussions on where the cut-off point should be, whether to keep two programs going together, which was the best, which was the most costly; where can we get the materials. Don't you think that is the reasonable way to do it, and when reasonable men with ability and competence in research and development disagree, that you should have a sitdown and a final discussion and decision?

I might say to you, nobody is clairvoyant, or omniscient so that he can see ahead of time which way this R. & D. is going to go, because there is no use doing it. Don't you think that is right? And that is all.

Mr. JOHNSON. Well, I am not so sure that I agree that programs of this type should be subject to constant committee reviews, particularly involving——

Mr. FULTON. I don't say constant, but when you get two competing systems that are tremendously costly systems, like Titan C and Saturn, don't you think at some point the proponents of each should be gotten

into a room, sit down, give their best efforts, and then make the decision?

Mr. JOHNSON. I don't disagree with the fundamental concept of review. What I disagree with is the people, too many people, without responsibility, participating in those reviews. It is the people——

Mr. FULTON. I am sorry—I might say in conclusion, I am sorry you are not in there yet. I always did admire you. Thank you.

The CHAIRMAN. Mr. Anfuso.

Mr. ANFUSO. Mr. Johnson, it is nice to see you again.

Mr. JOHNSON. Thank you.

Mr. ANFUSO. I know you are not trying to be political, you never have been.

Now, by your statement on page 2, you are not implying that the President in 1947 had available to him sufficient scientific information and knowledge by which he would have recommended a missile program, are you?

Mr. JOHNSON. No, I am not.

Mr. ANFUSO. But in 1953, you knew that the Russians had made some advances, and as Secretary of Defense Gates testified before our committee, he said at that time——

The CHAIRMAN. Mr. Fulton, excuse me, Mr. Anfuso—he has left, never mind. I wanted him to stay.

Mr. ANFUSO. Secretary of Defense Gates testified before our committee and he said: However, in 1953 we had developed certain information, we knew what the Russians were doing and we knew about the necessity of the thrust and we knew the necessity of developing a warhead. He said we had a decision to make and we decided on placing emphasis on the development of the warhead.

I asked him at that time: Mr. Secretary, why didn't we do both?

I think you would agree with me, Mr. Johnson, that this country could have done both in 1953, developed both the warhead and also the thrust mechanism; is that correct, sir?

Mr. JOHNSON. This piece of information, as I say in my testimony, was available to me in 1953. I was executive vice president of the General Electric Co., in charge of the electronics and consumer goods group, and we acquired this knowledge. And I agree with you. At that time I was concerned that we were not proceeding with the intercontinental ballistic missile rapidly enough.

Mr. ANFUSO. Let me ask you another question, Mr. Johnson. Dr. von Braun also testified that in 1956 he said we could have put up a large satellite, even before the Russian Sputnik. Do you agree with that, in 1956?

Mr. JOHNSON. Well, I don't know—of course, I have a great admiration for Wernher von Braun——

Mr. ANFUSO. I think he called it the Jupiter C.

Mr. JOHNSON. That is what I was going to say. He undoubtedly had reference to Jupiter C. If he says he could have put it up, then I believe him.

Mr. ANFUSO. That is what he said.

Mr. JOHNSON. Yes, OK.

Mr. ANFUSO. Now one more question. Besides being in disagreement about the Saturn, Dr. York was also in disagreement about the Nike-Zeus. He is still in disagreement about that. How do you feel about the Nike-Zeus?

Mr. JOHNSON. Well, I could flip a coin on Nike-Zeus. [Laughter.] But let me say this——

Mr. ANFUSO. Is it worth the study?

Mr. JOHNSON. Let me say this—it is the only possibility for defense against the missile for the next several years, and I am sure we cannot afford to take the risk of those dollars.

Mr. ANFUSO. In other words——

Mr. JOHNSON. We are 10 years away from anything better than Nike-Zeus.

Mr. ANFUSO. In other words, if the Congress had appropriated $114 million for the further development of it, you think that that money and possibly more should be used; isn't that correct?

Mr. JOHNSON. Yes, I would cancel something else.

Mr. ANFUSO. But not Nike-Zeus?

Mr. JOHNSON. Yes, I would cancel some other $140 million item.

Mr. ANFUSO. My time is running out, but I am being fast with these questions. Now, under this bill, there would be a division, NASA is going to develop the peaceful purposes and DOD is going to develop the military aspects. Somehow there is going to be disagreement, there is bound to be. Who would you like to have settle that disagreement? Would you like the President to settle it or would you create a Cabinet office for that purpose?

Mr. JOHNSON. I would not create a Cabinet office for that purpose; I would not recommend doing that.

Mr. ANFUSO. Tell us how you would do it.

Mr. JOHNSON. I believe it still must be settled by the President.

Mr. ANFUSO. I am through, Mr. Chairman.

The CHAIRMAN. Mr. Van Pelt?

Mr. VAN PELT. Mr. Johnson, referring to page 4 of your statement, the first paragraph, I am going to go backward just a little bit here by starting at the second last sentence: "In this brute-force approach lack of planning and mistakes are simply bulldozed under." Do you believe with the establishment of NASA and as we are operating now, that we are going to eliminate some of that?

Mr. JOHNSON. No, I don't believe the establishment of NASA will have any impact on the present systems approach to the defense systems. I do not believe that will result in any change on this.

Well, now, let me qualify that, I would like to add one thing to this: The concern I have had about transferring Saturn to NASA was that by so doing, since the Air Force has now been given primary military responsibility for space programs, that the Air Force would then begin to create its own system, including its own booster, and it is possible—unless you gentlemen watch this very closely—that we will be going down the road of developing another multibillion space system to put Dynasoar into orbit—to do many other things—and the military will not use the Saturn project, and we will have two parallel programs.

This must be guarded against. In other words, I think that the giving of this Saturn to NASA has made the possibility of even greater expense to the country and the development of a new weapons system more probable.

Mr. VAN PELT. Well, then, in reference to this bill, H.R. 9675, we are eliminating one committee or council, and there has been a great

deal of talk about establishing another liaison group between DOD and NASA. And again referring to that same paragraph, I am inclined to believe that you are not in sympathy with the establishment of that?

Mr. JOHNSON. Mr. Chenoweth, I believe we have got a reasonably good structure working. I think to have any more—I am sorry, Congressman Van Pelt—I believe the signs [laughter] I believe we have a reasonably good system working. There isn't any reason why the civilian military liaison committee can't be made to work. The services appointed some darned good officers to it. I just don't think it has had the direction and the desire on the part of certain people in the administration to make it work.

Mr. VAN PELT. I am glad to hear you say that.

That is all, Mr. Chairman.

The CHAIRMAN. Mr. Quigley.

Mr. QUIGLEY. I may owe you an apology. It seems to me the first time I ever asked you a question I gave you the needle—perhaps not as gently as I should have. I had just come back from Huntsville and I was kind of holding you personally responsible for Dr. von Braun and General Medaris not getting as much——

Mr. JOHNSON. I remember you very well, Congressman Quigley.

Mr. QUIGLEY. Money as they needed. Now, I find out you were in there plugging all along, and that is why I apologize. I have one question that I want to direct to your statement; on page 4, the second paragraph. You seem to accept the notion or the idea that somehow or other $41 or $42 billion should be the ceiling on our defense budget. I have very vivid recollections of the testimony on the question that my colleague from Pennsylvania brought up, back in the days of 1949 and 1950, when another man by the name of Johnson, Louis, convinced the President of the United States—then a man by the name of Truman—that this country couldn't possibly afford more than a $13 billion defense budget.

As a result of that, we had the squabble over the big aircraft carrier. We had the squabble over the size of the Air Force, and I think the record ought to show in the interest of accuracy that Mr. Symington resigned when the budget was cut below what he thought was a safe and sound level. Korea came along in June of 1950, and while Mr. Louis Johnson said the country couldn't stand more than a $13 billion defense budget, we seem to have taken it pretty well in stride.

Now, the thing that I am bothered about is: Have you, like Louis Johnson, mesmerized yourself into feeling that $41 billion is now the magic figure above which we cannot possibly go?

Mr. JOHNSON. Mr. Congressman, my own—perhaps I am giving the Republican Party line on this, but actually I don't feel that way, personally. I think that I am willing, as a citizen—and I have paid taxes in many thousands of dollars every year, and still do, Federal taxes—I am still willing as a citizen to pay more and more taxes for defense. I am not willing to spend it for some of this other—what I can call boondoggling. But when it comes to defense, I don't know what it is, but I will pay whatever is required.

On the other hand, you have got to keep eternally after these three services to stop some of these old-fashioned practices; stop trying to keep the old and encompass the new as well. This is characteristic of

our problem in industry. We hang on to the old-fashioned way of doing something too long, and it is costly, because we have to support the officers in charge and the people engaged in that activity. So I do think that there must be a constant paring off at the bottom of those things that are unessential to our defense and take some gambles that we aren't going to have a war this year or next, and put that money into preparation for the war that may come 5, 10, or so, years from now; that is what I am saying.

Just get rid of a few foot soldiers and you could spend hundreds of millions of dollars, for example, in more research. I would rather see a few less foot soldiers and more research, I would gamble that way if I was confined to this kind of a budget.

Mr. QUIGLEY. My basic point is, though, that an argument can be made that we ought not to be confined to this kind of a budget.

Mr. JOHNSON. If there is one thesis of my paper—and I suspect I ought to withdraw that sentence after looking at it again—if there is one thesis in my paper it is that I think we can afford anything for defense, but I don't think we can afford a constantly growing budget. I think we have to begin to choose.

I will stand by the statement that I don't think we can afford everything any more, but I think we are going to have to make some choices. National security I put first.

The CHAIRMAN. Will the gentleman yield?

Mr. QUIGLEY. Yes.

The CHAIRMAN. Aren't you, though, by transferring Saturn to NASA, simply adding to what you call the defense budget?

Mr. JOHNSON. Sure, we are adding to our budget; we are not kidding anybody.

The CHAIRMAN. You say that is a project that defense needs awful badly, but they say "We will let NASA have it." And you are not saving any money.

Mr. JOHNSON. No.

Mr. QUIGLEY. In other words, might not we be better off in this fiscal year if the Defense Department budget was perhaps $45 billion, instead of $41-plus billion, and the Saturn program and many other projects carried out under them? We transferred them to NASA so Defense won't go over its ceiling and give it to another agency, and the cost might go up 50 percent.

Mr. JOHNSON. I am afraid it will. I repeat the statement I made earlier; the concern I have is that the DOD now will develop another big booster and we will have two of them. I think the NASA program has too many boosters. I think again we are not using the rifle approach. Maybe we can't afford buckshot shooting any more; maybe we have to pick up the rifle and be more direct with certain programs, instead of trying to cover the waterfront.

The CHAIRMAN. Mr. Bass?

Mr. BASS. I have no questions, but I do want to make this comment on what my friend, Mr. Quigley, just said concerning our Defense budget, and the $41 billion figure.

Certainly we should spend what is necessary for adequate security, but I don't think the answer is just spending more and more billions of dollars. I feel very strongly that there is an awful lot of waste and duplication in our Defense Department, and our efforts should be

directed primarily to this end, rather than just piling on more billions of dollars for the three service chiefs to spend.

Mr. QUIGLEY. Would the gentleman yield?

Mr. BASS. Glad to.

Mr. QUIGLEY. I think this is the point the witness made, and I agree with him completely, and with you. I don't say more money is the only answer, but I don't happen to agree on an arbitrary ceiling—whether it is $13 billion or $41 billion. I think we tend to get stuck on certain magic figures that blind us to the realities.

Mr. BASS. Mr. Johnson, I just want to say again I think we can save a lot of money in our Defense Department and still have adequate security without adding more billions to what already is being requested.

Mr. JOHNSON. Mr. Congressman, I agree with that.

Mr. BASS. That is all, Mr. Chairman.

The CHAIRMAN. Mr. Karth?

Mr. KARTH. Mr. Chairman——

The CHAIRMAN. May I say this; a member of our staff just brought this matter to my attention. We also have another very distinguished witness here this morning—Mr. Pickering, who has come all the way from California.

Now, we don't want to cut either one of our witnesses short. I think what Mr. Johnson is saying is extremely important, so we don't want to cut either one short. Now, if we don't finish with Mr. Johnson on time, my thought is—I am willing to say we go over until 12:30 to hear Dr. Pickering. If we don't finish then, we can convene a little early this afternoon and hear him before the session this afternoon.

Mr. DADDARIO. Let's not eliminate Connecticut for California, Mr. Chairman.

The CHAIRMAN. Does he come from California or Connecticut?

Mr. JOHNSON. I come from Connecticut.

The CHAIRMAN. Yes; I see what you mean. [Laughter.]

Mr. JOHNSON. That is the point.

The CHAIRMAN. Well, we will not eliminate Connecticut.

Mr. Karth?

Mr. KARTH. I might say, Mr. Johnson, that I don't agree with you. I don't think you are giving the Republican Party line this morning. Quite frankly, I think that you are being extremely honest in your criticism of some of the things that you have seen as a result of being in a position that you have been in, and I, too, want to compliment you for it.

I would like to suggest that we cannot eliminate all of the foot soldiers and all of the tanks and all of the requirements that the Navy must have and the Air Force in those areas other than in the missile area. So, how much of this total defense budget we can cut out in favor of research in the field that you are interested, I really don't know.

I have suggested on occasion that perhaps 10 percent of the total military budget can be eliminated as a result of duplication and waste. I don't know how much further we can go on that. But I refer—and irrespective of the answer that you gave to Mr. Quigley—I refer to your fourth paragraph on page 4, where, in the last sentence, you say

maneuverable recoverable space vehicles and effective ballistic missile defense systems could alone eat up the $41 billion budget.

Mr. JOHNSON. In a period of time, yes.

Mr. KARTH. Well, a $41 billion budget for the fiscal year. Now, if this is true, and it seems to me that actually you are recommending or suggesting that we could spend about three times as much money, at least, in the missile field as we are spending.

Mr. JOHNSON. I would like to comment on this statement.

My point was not to eat up the total budget in the fiscal year. I should correct my statement to indicate that in a period down the road it could amount to this, some 5 to 10 years from now. I am sorry that I didn't make that clear.

Mr. KARTH. I see.

Mr. JOHNSON. What I meant was when it became operational. We are that far away from an operational system, and my statement should be qualified.

Mr. KARTH. Further down on page 4, Mr. Johnson, I notice that in the next to the last paragraph you end by saying—

> As an example, I believe we lag in the missile and space fields because of bad advice given to us over the past dozen years.

Whose responsibility is it to ferret out or separate bad from good, and then make the decisions?

Mr. JOHNSON. Well, Mr. Congressman, I think that there must be greater responsibility assigned to the Office of the Scientific Adviser to the President, or it ought to be eliminated. In other words, I do not believe that you can continue to have this kind of power without responsibility. Responsibility has got to go with it.

Mr. KARTH. In other words, you feel there are too many areas of jurisdiction all the way up the line, in most cases where these errors can be made, so when it gets to the top nothing can be done about them; is that in effect what you are saying?

Mr. JOHNSON. That is correct, that is correct. We have too many people in Government who have the authority to stop something.

Mr. KARTH. And once it is stopped no one is responsible?

Mr. JOHNSON. Right, no responsibility for the consequences of that stoppage.

Mr. KARTH. We have had some discussion about the unification of the services. Now, I don't know just where you feel this area exists, but there has been some discussion about unification to eliminate the squabbling in this case.

Mr. JOHNSON. I feel very strongly that unification of the three services into one service is absolutely vital for the security of our country, and we can't afford the luxury of the three different services any longer.

Mr. KARTH. And you feel because of these—let me see if I can quote you—

> Because of these traditions—

as you refer to them on page 2:

> Becaues of these traditions we are today engaged or embarked upon a program of duplication and waste that necessarily would not come about if we had the services unified.

Mr. JOHNSON. That is correct, sir.

Mr. KARTH. Thank you, Mr. Chairman.

Mr. CHAIRMAN. Mr. Hechler?

Mr. HECHLER. Mr. Johnson, I think your testimony this morning is a real shocker. I would like to say at the outset I agree 100 percent with what Mr. Bass was saying about the defense budget. I think if you didn't put a ceiling on it, why there is no place that it would stop. What it needs is not money, but leadership and decisionmaking and clear-cut objectives. Couldn't we get by with a lot less expense if we had such leadership, clear-cut objectives and decisions to move forward, instead of, as you say, decisions to stop?

Mr. JOHNSON. Mr. Congressman, I agree with that statement completely. My whole point is that this budget has become the principal management tool for the lack of other management.

Mr. HECHLER. That is correct, and what we need to do is not to increase the budget and not to provide for more sloppy management and unnecessary expenditures and duplication, but to provide the mechanism for leadership. I don't want to pussyfoot around here, there have been a lot of people talking around the point and we have been arguing in a frustrating way in this committee for weeks about who is responsible for this.

I say that the President of the United States has the responsibility. Why do we go around criticizing the Bureau of the Budget for holding up the Saturn program for 6 months? If the President of the United States had stepped in and exerted the clear-cut leadership which he constitutionally has, all of these things would have fallen into place and the program would have moved forward with the utmost urgency. Back in 1941, when we were trying to decide in this country in a very grave crisis how many airplanes to manufacture, various people came to President Roosevelt and said: "Well, I expect perhaps we could produce 30,000 to 35,000 planes in this country." And President Roosevelt said: "Go back and sharpen your pencils, we need 50,000 planes a year." And the same thing happened with the production of steel. They said—the steelmakers said: "We could perhaps produce 90 million tons." And President Roosevelt replied: "Go back and sharpen your pencil, we need over 100 million tons."

So I say that this is directly the responsibility of the President of the United States, rather than any civilian-military liaison committee, activities coordinating board, ARPA, NASA, DOD, any of these other officials. If we had the leadership we would then move forward.

I wouldn't blame it on the people of the country either, as you have said here: the people take national leadership for granted and complain if asked to devote more time and effort and planning to it.

I think most people are like you, they want to pay more taxes if they can get the type of program that will make our country secure. The people of West Virginia would throw me out of office if I suggested that we ought to cut down expenditures for these things. They don't want agricultural subsidies, higher veterans' benefits, public works, and these other things that you talk about; they want national security. They are yearning for the President of the United States to exercise the leadership which he constitutionally possesses, and which he has refused up to this point to assume.

My question is: Is it not true that we need this type of firm national leadership if we are going to move forward in this country?

Mr. JOHNSON. I couldn't agree with you more, Mr. Congressman.

Mr. HECHLER. Thank you, Mr. Johnson, your testimony has been illuminating.

The CHAIRMAN. Mr. Daddario.

Mr. DADDARIO. Mr. Johnson, interwoven in your statement here this morning is the idea that we should do things because they are the right things to do, and not because we are following what the Russians are doing by establishing programs which follow their lead. You have also tied in the idea that you think it is a possibility that they may some day soon, have the capacity of storing nuclear warheads in orbiting satellites which could be unleashed on command.

Now, this being so, I imagine you feel we ought to proceed with a program with a great sense of urgency so that we can protect ourselves in the event this capacity is realized by the Russians. Because of the fact that this is expensive—and I agree with you that it has reached the point where it is so extremely expensive that there has to be a more efficient operation—I wonder, with your experience and all, what you feel ought to be our primary objectives in space? What ought we to be shooting for; what should we eliminate?

Mr. JOHNSON. This will take a little long to answer, but I have thought a lot about this question, and I go back to General Dornberger, who handled Peenemunde for Hitler. He commanded 20,000 scientists. He has told me many times that that group of experts of military strategists conceived of using space—and this is back in 1939 and early 1940—of using the first 500 miles in space as a great military maneuvering area. Dornberger repeatedly says: "Forget everything but the first 500 miles for now, conquer that. Learn to defend yourself in the first 500 miles."

I am convinced that the Russians got all of these ideas from the scientists that they captured and took with them to Russia. I am convinced that they must be planning to use this 500 miles.

Now, to use it effectively you can envision the Saturn project; first of all, putting very large objects into orbit that could maneuver, like Dynasoar, a version of X–15, and be used for defense purposes, knock out other missiles that are orbiting; could be used and commanded without men electronically to come in and deliver the weapon at any given point. But it would take Saturn to do it; it would take that kind of thrust, because it has to be a great big thing that you put up there, with all the reliability that we need. It has to have many sets of batteries. It has to have many pieces of electronic gear to switch over to when one goes out, so it needs huge mass.

There is another project that I think is entirely conceivable where we can defend ourselves against the Russian missile attack by putting into orbit very large space vehicles that would discern the Russian missile on the launch pad and could then even hit a salvo of them. If they shoot off 100 at a time we could knock them off, but it would require billions and billions of dollars to have a system up in the orbiting area that was ready to do this on an instant's notice.

This is the kind of thing that can happen if we continue to be at war with Russia. But we are only giving lip service to pursuing this kind of thinking and planning, and more importantly spending the money. That is why I think that to say the Saturn has no military utility, no military usefulness, that is just the shortest sighted think-

ing, and I get concerned that we have that kind of thinking, because it definitely indicates that we are not looking down the road any 10 or 15 years.

Mr. DADDARIO. Ought we to be spending the billions that you say will be needed in order to bring this kind of program to completion?

Mr. JOHNSON. It is a curve. I think we could be spending in the Department of Defense four times as much as we are spending now in space. I don't think you could spend perhaps more than four times; in other words, we ought to spend a couple of billion dollars in defense now out of the $41 billion. We ought to find some other things we can cut out.

As time goes on, we have got to cut more and more of the old-fashioned things and add more and more and finally—coming to Mr. Karth's question—we come to the point where the whole $41 billion will be in the two projects I just indicated. When that point will be reached, I can't say. It may be 10 years, it may be 20 years down the road. We either keep adding to our budget or we cut out the old-fashioned ways of doing things. We have to have more research money put in now.

Mr. KARTH. I would suggest if the Republican Party is seriously considering another person as its presidential candidate, that they give serious consideration to Mr. Johnson.

Mr. JOHNSON. My goodness, thank you.

The CHAIRMAN. You haven't thrown your hat in yet.

Mr. DADDARIO. It would cause a few complications——

Mr. JOHNSON. It sure would.

The CHAIRMAN. Any further questions?

Mr. DADDARIO. Who ought to be in charge of this program, Mr. Johnson, the military or the civilians?

Mr. JOHNSON. I think military people have got to be concerned with the defense of our country. You can't turn this over to civilians. I feel that we have got to find some way to make the Joint Chiefs of Staff work. I believe the Joint Chiefs have got to do this job, and think it through, and we have got to give them the confidence and the money to back them up.

Mr. DADDARIO. Do you contemplate that these maneuverable vehicles you are talking about will be manned or unmanned?

Mr. JOHNSON. Both.

Mr. DADDARIO. If they are manned, the Department of Defense should have continuing capacity, for example, in aerospace medicine?

Mr. JOHNSON. Must, absolutely. This idea that there is no purpose for a man in space, that was enunciated, I think, as a part of the President's primer that there is no reason to have a man in space. I have disagreed with that statement, violently disagreed with that statement. Yet that statement is constantly being made. There again, eminent scientists continue to talk this way, and I am greatly concerned why they must insist on this. What is wrong with a man in uniform being in space? What is wrong with him being on the land, in the air, and water?

The CHAIRMAN. Mr. King.

Mr. HECHLER. Would the gentleman yield?

Mr. KING. Yes.

Mr. HECHLER. Mr. Johnson, what would you think of putting a Director of Space and Aeronautics in the White House, who could

be an extension of the President's position, who would be somewhat more than simply a scientific adviser, but who would be a man who could exercise, under the authority and acting with the President in the White House, the authority of decision over these vital programs that are so vital to our national security?

Mr. JOHNSON. Well, I think we are thinking from the wrong posture. I am all for scientific space exploration. I don't know how much I am willing to spend on it as a taxpayer; I am talking about pure science. I think that ought to be a collateral thing rather than the principal thing.

I think that we now know that space offers a new threat to our national security. I think we should turn this job over with all the authority to the people who are responsible for our security. Then I think if we want to have expeditions for scientific work that have no military implications, let's have them in a neat little niche over here someplace and fund it as we fund anything scientific, but first we must make the military people understand that they have this primary responsibility.

Mr. HECHLER. I don't want to take too much of the gentleman's time.

Mr. JOHNSON. Unless we do that, then you are going to have to create this other entity, and then you are going to have a British Ministry of Supply. I think you are going to make this thing impossible in terms of a national defense posture.

The CHAIRMAN. Mr. King?

Mr. KING. Mr. Johnson, you stated a while back that you were complaining against the system, and you have elaborated on that. You pointed out, for example, that there are too many men who have the power to veto, but who do not have the correlative duty to come up with something positive; is that correct?

Mr. JOHNSON. That is correct.

Mr. KING. Lack of unified command.

Mr. JOHNSON. They don't have the responsibility for being called on the carpet when the results show their decisions were wrong. This is it. Nobody checks up on these fellows and says: "Now, look, last year you decided this for me, or you made this decision, and we followed it, and it was completely wrong."

We have none of that in our system.

Mr. KING. Some general has testified—I forgot who it is—but I remember his saying that there were 15 men over him who could say "No" to any plan that he came up with. He was saying about the same thing that you are saying.

Mr. JOHNSON. Yes.

Mr. KING. He was despairing of the fact that there were too many who had the capacity to say "No." Do you agree with that?

Mr. JOHNSON. Right.

Mr. KING. One other thing, Mr. Johnson. General Gavin yesterday strongly urged a Space Command within the Department of Defense. He said this might either take the form of a fourth arm of our service, but not necessarily. What he wanted was a Space Command that didn't have to go through the other three branches of the service, but could make overall decisions about space insofar as they affected national defense.

I asked the question of General Gavin whether ARPA could serve that purpose if it were enlarged a little, and he said he thought not, that ARPA had not actually been set up to do this type of job, there were built-in limitations, and he had something in mind that was a little bigger than that. Would you care to comment on that?

Mr. JOHNSON. Congressman King, again I don't want to be too critical, but I think we are defeating our own objectives when we keep on adding entities and not facing up to the basic reorganization. I don't think we are going to improve this whole space business by writing a new law or creating committees or new councils or new coordinating boards.

I don't think we are going to solve our military posture by creating a Space Command. You have got to get rid of the three services, as such, and have one service, and then the guy running that decides what he is going to do in space. You see, right now you would have to have a fourth service, there is no question about it. Sure, ARPA couldn't do this; ARPA was never intended to be an operating group; it is a scientific research group; it wasn't ever going to operate anything.

But if you did this, you are going to have a fourth service, and this just makes things four times as bad.

Mr. KING. It just gets back to your basic thesis, that they ought to be unified?

Mr. JOHNSON. Yes. On the other hand, if the country is convinced that we can't break down the tradition, then, rather than capitulate, I would say yes, let's have that Space Command. But my goodness, let's not do that unless we have to.

Mr. KING. Do you think we could have a unified Department of Defense and still retain some of the fine tradition that the three respective services have built up? You know what I have in mind?

Mr. JOHNSON. No; I am afraid not. I am afraid they are all going to have to wear one uniform. I mean, to fool around with it won't answer anything. I think the traditions——

Mr. KING. They won't sing "Anchors Aweigh" any more?

Mr. JOHNSON. Oh, yes; we could probably have a half-dozen service songs and keep all the service schools going that we now have, and then you could have old home night and reminisce about the old days.

The CHAIRMAN. The space man ought to have a space uniform.

Mr. JOHNSON. That is what it is going to come to.

The CHAIRMAN. We certainly want to thank you, sir. We really would like to have you back at some other time. You have been most helpful to us.

We have a witness standing by from California. Would you be available at some later time?

Mr. JOHNSON. Yes, sir, Mr. Chairman.

The CHAIRMAN. Mr. Hechler.

Mr. HECHLER. Why did you leave the Government, Mr. Johnson?

Mr. JOHNSON. I want to make this very clear. I did not leave the Government because of anything I have said today. When I agreed to go to Washington I said I would do this for 18 to 24 months. I have my own timetable of the things I want to do for the rest of my life. I said I would organize this Agency, and I did; it was running

when I left. There was very little more for me to do. I did not agree to come down here and be a crusader. I haven't said anything until today, and I have been gone from Washington for 4 months. I haven't said anything about this problem before today.

I decided to do this today because in the intervening 4 months since I have left the Washington scene, I have ceased to be influenced by getting these day-to-day things done; I have had time to think. I have been able to look objectively at the problem. So what I say today comes from a conviction today and one which I didn't necessarily have on November 15, when I left.

The CHAIRMAN. We certainly thank you, Mr. Johnson. We are going to call upon you later on.

Mr. QUIGLEY. I don't want to impose on Dr. Pickering's time. But in another 4 months would you be willing to come back as a crusader? [Laughter.]

Mr. JOHNSON. God forbid.

The CHAIRMAN. We certainly thank you, sir. You really have given us something to think about this morning. In fact, you have given us more than both barrels; you have given us all barrels.

Dr. Pickering, we are happy to have you here this morning. Just come forward, if you will, sir.

I understand that there will not be anything early on the floor, and for that reason we may go over a little bit. This afternoon perhaps we'll convene for a little while, but I want to caution everybody about our scheduled meeting this afternoon. It is a very important meeting, and it is a decision meeting. So, Dr. Pickering, I think you have a statement.

Dr. Pickering, as everybody knows, is Director of the Jet Propulsion Laboratory, California Institute of Technology, and we are certainly happy to have you here. We have been looking forward to hearing your testimony.

If we don't finish this morning we will meet again this afternoon, right after lunch. You have a statement, and if you will proceed with it, we will be happy to hear it.

Dr. PICKERING. Thank you. As a scientist, I am not sure what I should do at this stage. [Laughter.]

But I would like to read this statement.

The CHAIRMAN. We have had a change of background and scenery a little bit. [Laughter.]

STATEMENT BY DR. WILLIAM H. PICKERING, DIRECTOR, CALIFORNIA INSTITUTE OF TECHNOLOGY, JET PROPULSION LABORATORY

Dr. PICKERING. I am grateful for this opportunity to discuss with this committee the changes proposed to be made in the Space Act of 1958. I do not think I am overstating the case when I say that satisfactory solutions to some of the problems facing us in this area are central to the welfare of this country. We must recognize that the United States is firmly engaged in a space program. We are in space and we will be for years to come. Certainly the actions we take now and in the next few years will have an ever-widening effect on the character of the program the United States pursues in the exploration of the universe.

It seems to me that such problems as exist stem from a complex of causes. First, there is the fact that the U.S. space program is not simply a scientific undertaking to explore space. It has an importance that exceeds the scientific motivation, and indeed we have seen recently that our space program is becoming an instrument of national policy.

Secondly, the space program is being conducted by two agencies, the National Aeronautics and Space Administration and the Department of Defense. Each agency has clearly stated roles, one in the military application and the other in the scientific-cold war application. Yet, there is some evidence that the two agencies do not fully agree on their respective roles.

Finally, the space program is enormously expensive. Having said this, it is transparent that duplication of effort, waste of talent and resources, and marginal programs cannot be tolerated. In this costly new field, with a wide variety of exciting and tempting tasks to perform, one must exercise great moderation to choose and pick within the framework of our ability at the moment, so that a relatively few assignments are performed well. The alternative, of course, is a great number of tasks performed poorly.

Part of the misunderstanding relating to the space program, it seems to me, stems from a larger problem. This is the increasing importance of the role of technology in U.S. policymaking. When we associate science and Government, there is a tendency to assume that when we say "science" we mean military science. There are quite logical reasons for this misunderstanding, but it is important to point out that in these days of the cold war propaganda, nonmilitary science and technology may indeed be as important to the Government as military science. I am not saying, of course, that this is an either/or choice; that one must choose nonmilitary science in place of the military technology, or vice versa. I am saying that in some of the concern expressed over the space program, we have tended to overlook the value of nonmilitary applications.

However, in view of the long history of support of scientific research by the Department of Defense, it is evident that problems may arise if extensive programs are established outside of the Department of Defense, particularly if these programs appear to impinge on the military field.

The Department of Defense indeed can claim credit for sponsoring a major part of our technological advances in the past decade, but on a long-term basis it appears to me that we should now try to agree on the value of Government support of nonmilitary science and technology. When such an agreement is reached, clearly a mechanism to express such support must be developed.

At the present time, of course, the major agencies conducting such work with Government support are the National Science Foundation, the National Aeronautics and Space Administration, and the National Institutes of Health. The Atomic Energy Commission is in a special category, since it has a charter calling for—

> the maximum contribution to the general welfare, subject at all times to the paramount objective of making the maximum contribution to the common defense and security.

Consequently, the AEC serves both a military and nonmilitary function.

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Some critics of the space program as it stands today have suggested that it should be established under an AEC-type organization. This indeed would serve the purpose of unifying both civilian and military factors in the program, but in view of the large and valuable experience pool existing in the Air Force, it does not seem reasonable to attempt to transfer this capability to another organization. Therefore, I do not believe that the solution to the problem is to extend the charter of the NASA into an AEC-type organization.

In considering possible changes in the Space Act, it seems to me that we should start with an assumption that no major organizational changes should be made. The progress that has been made in the past year, and the status of working plans for the future combines to suggest that the present organization is entirely capable of performing its assignment. To me, the achievement of Dr. Glennan and his staff in organizing, on the run in a new field, in getting together a bold imaginative program in less than 2 years, is one of the triumphs of men over circumstances. Any major changes in this organization would do nothing but harm.

Consequently, I conclude that the objective of any change should be to assure better working relationships between the NASA and the Department of Defense so that each is free to pursue its own assignments. For example, the abilities and interests of the Department of Defense should be utilized fully, but this should be done through a clear understanding of national goals and a national space program, followed by an assignment of responsibilities in all major areas which is consistent with the interest and ability of the group concerned.

The fundamental distinction between civilian and military objectives should be clear. Among other things, it is clear that the responsibilities for frontier-type developments, and for research and development, must continue for the foreseeable future to rest with NASA. The problem is to determine the relative proportion of our resources which should be devoted to each area. If this could be agreed upon, I would expect no major difficulties. There is no problem, for example, of supporting a major in-house space capability in the Air Force. With the transfer to the NASA of the Development Operations Division of the Army Ballistic Missile Agency and the Jet Propulsion Laboratory, the large Government-supported space laboratories are now within the NASA.

In order to arrive at a proper national space program, I do feel that a formal coordinating mechanism between military and civilian planning is required. Dr. Glennan has pointed out that effective coordination between the two groups can occur only if there is a close relationship at all working levels. And, I could add, if there is a real desire for coordination. In this I concur, with the added stipulation that such coordination must occur also at the program planning level.

To bring this high level coordination about, I believe it will be necessary to take action above that which the revision of the Space Act suggests.

Undoubtedly, a number of solutions are feasible. One possibility would be for deputies of both the NASA Administrator and the Secretary of Defense to be cochairmen of a small planning group which establishes programs within policy guidelines laid down by the President. The actual solution is perhaps a matter for executive action,

but the Congress should assure itself that the total national program indeed is coordinated as the spirit of the Space Act demands.

In conclusion, please allow me to express to the members of this committee, and through you to the Congress, my thanks for the fine support and understanding you have given the national space program. Thank you.

The CHAIRMAN. Doctor, a very splendid statement.

Now, I will reverse the procedure of the committee, since a request has been made for me to do it.

Mr. King, any questions?

Mr. KING. I have no questions.

The CHAIRMAN. Mr. Daddario.

Mr. DADDARIO. Mr. Bass, sir?

The CHAIRMAN. Oh, yes. Mr. Bass.

Mr. BASS. Dr. Pickering, I gather from your statement that you are here in support of the proposed changes in the Space Act as outlined in H.R. 9675?

Dr. PICKERING. Yes, sir, with the added comment that I do feel this question of coordination between NASA and DOD is an urgent one, but I believe it can be solved through action of the executive branch and does not have to be written into the legislation.

Mr. BASS. In other words, as I understand it, if this bill becomes law, you feel that the proper coordination will be brought about?

Dr. PICKERING. Yes, sir.

Mr. BASS. As provided in the bill?

Dr. PICKERING. Yes, sir.

Mr. BASS. That is all, Mr. Chairman.

The CHAIRMAN. Mr. Daddario.

Mr. DADDARIO. Doctor, on the fourth page of your statement you refer to the large and valuable experience pool existing in the Air Force, and you say that it does not seem reasonable to attempt to transfer this capability to another organization.

Later on you say that you believe that they can work out an effective coordination between the Department of Defense and NASA and earlier you pointed out the same thing which Mr. Johnson pointed out, that is, the expense of this space program. It is enormously expensive.

Dr. PICKERING. Yes.

Mr. DADDARIO. I would like to ask you about just one thing; whether or not you would include this within the area of those things which should not be transferred.

The Department of Defense presently has a capacity in the aerospace medicine field.

Dr. PICKERING. Yes, sir.

Mr. DADDARIO. NASA has appointed a man to head a new section within the Space Agency to have similar responsibility.

Dr. PICKERING. That is right.

Mr. DADDARIO. I wonder if you believe that this would be a duplication or not, and if so, why?

Dr. PICKERING. Sir, I would regard it as a duplication if NASA proceeded to set up the type of laboratory facilities which already exist within the Department of Defense in this area.

It would seem to me that the major problem here is to see that there is proper cooperation between two agencies so that the aero-

space activities of the Department of Defense and of NASA are put into a common pattern.

Right now, of course, the astronauts in training were selected from the Department of Defense and a great deal of their training activities are being conducted on Department of Defense facilities.

So that I feel that there is no evidence in my mind at the moment, there is no evidence of any duplication or NASA's attempt to duplicate the capabilities of the Department of Defense in this field.

Mr. DADDARIO. If there is to be expansion in the future, and certainly there must be insofar as this overall problem will be concerned, in order to put a man into a maneuverable space satellite, for example, and if there has to be the development of additional facilities, would you start from scratch within NASA or would you build on top of the facilities and within the experience that the Department of Defense now has, and provide for NASA to pass its requirements to the Department of Defense?

Dr. PICKERING. I think I would build it on the Department of Defense capability in this case. I think that there is a precedent for this sort of thing if you look at the NACA operations with the Department of Defense, in such things as testing new aircraft. It is quite common for testing of experimental airplanes to be done by either Air Force people or NACA people, and it seems to me one would expect a similar sort of situation to develop here.

Mr. DADDARIO. Thank you. That is all.

The CHAIRMAN. Mr. McDonough.

Mr. MCDONOUGH. Dr. Pickering, we are always glad to have you here. You are doing a fine job in the Jet Propulsion Laboratory and your advice and counsel has been a great help to this committee.

I think the most significant thing I notice in your testimony that is a practical solution to this coordination of Defense and NASA is your statement on page 6 where you state that the NASA Administrator and Secretary of Defense ought to have deputies who are cochairmen of a small planning group. That seems to me to be a very practical solution for almost complete coordination of all the essential facilities of the two Departments to accomplish the objectives we are seeking.

I think it would be very well for the committee to consider the proposal that has been made here, and to provide in very general terms in the bill something of that nature. I think it would be a great help. I don't believe in writing legislation that would be rigid and specific to the point that there is no leeway on either side.

This would give a rather broad perspective and broad authority.

Mr. ANFUSO. Would you yield there a minute?

Mr. MCDONOUGH. Yes.

Mr. ANFUSO. I believe following the line of Dr. Pickering, you would write something to that effect into the law.

Mr. MCDONOUGH. Into the law in broad terms; not outlining their duties to a point that they can all refer back to the act and say, "Well, the act doesn't give authority to do this."

Give them broad terms and broad authority. That is all.

The CHAIRMAN. Mr. Hechler.

Mr. HECHLER. On page 5, Dr. Pickering, you state the problem is to determine the relative proportion of our resources which should

be devoted to each area, and you say, "I do feel a formal coordinating mechanism is required."

Dr. PICKERING. Yes, sir.

Mr. HECHLER. Did you hear the testimony of Mr. Johnson?

Dr. PICKERING. Yes, sir.

Mr. HECHLER. Don't you feel that we are putting perhaps too much stress on liaison, coordination, and exchange of information and not enough stress on the power of decision and leadership and would it not be necessary to have someone here with the power of decision who could not only set the national objectives, but also make sure that both of these programs mesh and move forward to serve the national objectives?

Dr. PICKERING. Well, sir, I must agree with much of what Mr. Johnson said in this area. I think this is indeed one of our problems today. I have indicated here a statement of policy guidelines laid down by the President. At least that there should be, there must be some guidelines to enable any coordinating committee to make decisions as to distribution of resources or distribution of the programs.

Mr. HECHLER. If these policy guidelines are going to be broad in order to avoid putting the operating officials in a straitjacket, isn't it necessary still to have a person who can make the day-to-day decision in a clear-cut fashion?

Dr. PICKERING. Yes ,sir. I have indeed testified, I believe, before this committee a few weeks ago to the effect that I felt that the unity of the program was the most important thing and I felt unity under civilian direction was important.

What I am suggesting here is that we have, in effect, established an organization, a NASA, DOD, and a working arrangement between the civilian and military programs. So in effect what I am asking for is a time to make this work, to see if this will work.

In other words, I believe that given the right attitude on the part of the senior people concerned there is no reason why this can't work.

In other words, I guess I am saying I believe that this can work on the grounds of good faith on the part of the participants rather than to have an enforced direction which would have to be chosen as either civilian or military.

Mr. HECHLER. Haven't we up to this time leaned perhaps too heavily on the good faith of the participants and had some sad experiences and lack of coordination and lack of unity of purpose?

Dr. PICKERING. I am afraid I must agree with you.

Mr. HECHLER. Mr. Johnson put his finger on a number of problem areas.

Dr. PICKERING. Yes. Although here I think that our problem has been complicated by the question of understanding our purpose.

In other words, had we known clearly enough what our national purpose was in this area—I mean, for example, Mr. Johnson was stressing the importance of space as an area of military operations. It happens I disagree with him. Whether I disagree or not is irrelevant, but what I think is important is that we should have a well-established national understanding as to what is the objective and what is the importance of space to the military or to the civilians.

Mr. HECHLER. Wouldn't it be most appropriate then for the President of the United States to state clearly and definitively that national objective and purpose?

Dr. PICKERING. Yes, sir.

Mr. HECHLER. Just one further question, Mr. Chairman, if I have time.

The CHAIRMAN. All right.

Mr. HECHLER. You mentioned in your previous appearance before the committee that early in the relationship between JPL and NASA there had been some areas of disagreement which you believed had been subsequently worked out. Now, are you getting the fullest amount of funding support from NASA at the present time that you need for the most important work that you are carrying on in JPL?

Are there any things that could be done by NASA in order to speed your own work?

Dr. PICKERING. Well, sir, one can always say if we had more money we could do more.

Mr. HECHLER. In what areas?

Dr. PICKERING. In the areas of doing a more thorough job on the programs which we are embarked on.

In other words, in this sort of research activities when one puts down a program and commits to a schedule, to a set of objectives, the probability of success with which you meet those objectives can vary over wide margins depending on the effort that you put into an attaining of the objectives.

Mr. HECHLER. What I am trying to pull out of you, Dr. Pickering, is perhaps specifically what project would move along faster if you had additional support?

Dr. PICKERING. Well, in a general way we are responsible for the lunar and planetary programs. We visualize the program involving certain experiments with the Agena-B vehicle to the Moon in the 1961–62 period.

With additional support one could perform more complex experiments and presumably perform experiments with a somewhat higher chance of complete success.

Mr. HECHLER. Thank you, Dr. Pickering.

The CHAIRMAN. Mr. Wolf.

Mr. WOLF. I have no questions, Mr. Chairman.

The CHAIRMAN. Mr. Quigley?

Mr. QUIGLEY. Doctor, I have a question.

You heard Roy Johnson testify and you heard him express his concern over the fact that the transfer of the Saturn program from the Army to NASA will probably in the long run cost us much more money and it increased the likelihood that one of these days we will see the Air Force go off on its own program for a big booster.

Dr. PICKERING. Yes, sir.

Mr. QUIGLEY. Do you have any knowledge or information that such a big booster program for the Air Force might already be in the wind?

Dr. PICKERING. Well, sir, I understand the Air Force is supporting a so-called study program to develop every large solid propellent boosters. I believe the specifications of those boosters is in the order of some 20-million-pound seconds total impulse.

Now, this is a capability comparable to Saturn. At the present time, as I understand it, this is a study contract with—I don't know

whether it is one or several solid propellent manufacturers—but quite frankly, I would express concern as to wether or not this is intended to lead into a large booster comparable to Saturn, or whether this is a next step in ICBM developments or what it is, I frankly don't know.

But it is a program to develop a method or with capabilities not too far distant from Saturn.

The CHAIRMAN. Doctor, I don't know if the reporter is getting what you are saying. If you could talk up just a little louder, it would be helpful.

Dr. PICKERING. Sorry, sir.

Mr. QUIGLEY. As I gather, the original announced negative thought on the Saturn program was that the military had no use for the big booster.

Dr. PICKERING. Yes, sir.

Mr. QUIGLEY. Didn't I hear some testimony today, and other testimony, that the real reason might have been that they didn't have the money, and the transfer to NASA was a gimmick or a device whereby it was passing the budget buck to another agency and the people in that agency and others concerned were so anxious to have the program move forward they were willing to go along with it.

Dr. PICKERING. I must confess this is the first time I had heard that the transfer of the Saturn was related to the fund problem, quite frankly.

Clearly, if I may be allowed to comment on this whole problem of military science, one can obviously find great differences here between say Mr. Johnson and myself and Mr. Johnson was, of course, quite critical of much of the scientific advice which was received by the Department of Defense.

I would like to defend this, if I may, as shall I say a representative of the scientific community.

Mr. QUIGLEY. Demanding equal time. [Laughter.]

Dr. PICKERING. Equal time. If I may start out, for example, with Dr. Bush. If we look at the situation which existed in 1947 there was indeed consideration of the use of guided weapons to carry warheads halfway around the world in an automatic fashion.

In other words, some sort of a guided vehicle was under consideration. The choice at that time was: Should this be a ballistic-type weapon or should it be a weapon with wings on it? There was practically no experience with ballistic weapons except the German experience with the V–2's, and also the requirement was that this have the capability of delivering atomic warheads.

In those days atomic warheads were very heavy. Calculations showed that in order to produce a ballistic-type weapon to do this, that the size of the ballistic-type weapon would be immense; it would, of course, be considerably larger than the present Atlas, and with the state of our knowledge at that time and with a commitment from the people who were in the winged airplane business that they could make devices to do this in a relatively few years, the decision was made to go ahead with the winged weapons.

The Navajo was the project, of course, the Navajo and the Snark were the two projects.

Based on the information available at that time, I think this was the right decision.

Now, you can find scientific studies of this which argued strongly against it, which said that the ballistic weapons in spite of their size and in spite of the extrapolation from the state of the art at that time were indeed competitive and should be considered. In fact, I can show you reports written by people at the Jet Propulsion Laboratory to this effect.

Nevertheless, weighing the question against the size of the warhead to be carried, the known technology in the winged airplane, the decision was made to go ahead with the winged craft, and I don't think that Dr. Bush should be blamed quite as much as was stated in this statement here.

Now, since that time, if we look at some of the other scientific advice, if you like, which the Government is receiving now, you can again find scientists who will be conservative and others who will be very radical in their ideas as to the sort of scientific weapons which can be built.

Mr. Johnson talked about some of these things, including this one of having orbiting satellites with warheads aboard them.

Now, certainly it is possible to, shall I say, to study, to analyze, to devise scientific weapons systems which will do this sort of thing. In other words, there is nothing technically impossible in establishing an orbiting satellite with a warhead aboard it with a capability of dropping that warhead at any place on the Earth.

However, I submit that some of these studies of scientific weapons systems tend to lose sight of the ultimate objective, and if the ultimate objective is to deliver a warhead to some other point than the Earth, it seems to me the question you ask yourself is, What is the easiest way to do it? Is the easiest way to do it with an ICBM or to do it with an orbiting satellite? And the answer must be the ICBM because the orbiting satellite has so many complexities, so many items of cost, so many problems associated with either maneuvering in space or only being able to drop the warhead at certain specified times of the day or the year or whatever it may be, that you get yourself into, it would seem to me, if you put yourselves on the basis of comparing the two weapons systems, that the ICBM weapons system is far and away better than the orbiting satellite bomb.

Now, if this is the case, then you ask yourself then, Why do you get excited about satellite bombing?

My point is that we have, indeed, I think been carried away with some of the things that science could do, given enough money and not ask ourselves the question, What are the right things for us to be doing in a technological way? What are our real objectives?

It was only a few years ago, for example, that the ICBM was talked about as the ultimate weapon. Is it still the ultimate weapon?

If ultimate means anything, are we recognizing that in our thoughts about future systems? So it seems to me then that when we criticize scientific advice which the Government is receiving, I think we have to not be carried away by these scientific dreams, I will call them dreams although they are certainly practical of achievement given enough money; we have to rather ask ourselves, What are the real problems which we have to solve?

Then evaluate them.

Mr. QUIGLEY. Doctor, I just have this point: We have had witnesses come before us and say in effect, "Look, don't preoccupy yourself with

duplication; a little duplication is absolutely necessary and perhaps a certain amount of it is a good thing."

Now, Mr. Johnson in effect said this morning:

> We can't do everything, so we are faced with the choice of either cutting down on certain things we are doing or building up our budget or both.

He didn't say both, but I think this is the obvious answer that you are forced to come to.

Now, he suggests that we cut back on our foot soldiers and we go ahead on our scientific research. All right, we can do this to a certain point, but I don't think we can run it into the ground to the point where we have no foot soldiers.

It seems to me another source of great potential strength that we are dissipating is in the duplication. I don't really think that the country could have afforded, sanely, the duplication of Jupiter and Thor. I don't think the Nike-Zeus and the Bomarc instance is the way we should do it.

Frankly, I am frightened if we are going to start doing this thing all over again in the Saturn-type field.

Dr. PICKERING. Yes, sir.

Mr. QUIGLEY. If NASA is building a liquid Saturn at the same time the Air Force is going to start working on a solid-fuel one, I think we may as well all give up and join Mr. Johnson in his painting, because I just don't think we can afford this thing. So the problem comes back: Who decides what we are going to do? How best can we make these decisions? You came in here a month or so ago and suggested there ought to be one man and he ought to be a civilian.

Today you are kind of sliding away from that and you end up by saying the actual solution is perhaps a matter for Executive action.

Dr. PICKERING. Yes.

Mr. QUIGLEY. But isn't this the real problem?

Dr. PICKERING. Yes, sir; I certainly agree that we are talking about projects which are so expensive that they are taking a large fraction of the national product here, and we cannot afford duplication just to satisfy someone's ego, or whatever it may be. There may be some cases where duplication is necessary, but I think that they are very few and I would agree with you, for example, that the Thor-Jupiter instance is an example of unnecessary duplication.

Now, the problem of whether one can do this without setting up a rigid one-man line of responsibility—I mean whether we can ever work together without setting up a rigid one-man system—it seems to me is obviously at the heart of it.

What I am suggesting and I grant it is sliding away from what I said a couple of weeks ago, is that as a working solution here we should rely on a real national policy, on a definition of roles and missions and then on a watchdog congressional committee to keep abreast of what is going on and to keep on to it.

Mr. QUIGLEY. As far as the specific issue before this committee, I gather your attitude is that it will do no harm for the Congress to pass the proposed reorganization that NASA has recommended, but that we would be kidding ourselves if we thought this was the ultimate or the final answer?

Perhaps I have stated that wrong.

Dr. PICKERING. Let me say it positively.

I think that if the Congress was to attempt any reorganization of the space program on a national—looking at it as a real unified national program, that we would just introduce so much more in the way of transients into the system that we would seriously damage the progress which we are making now. But that whether or not this proposal is an ultimate solution or not I think depends on the actions which would be taken by the Executive in keeping the Department of Defense and the NASA activities properly in line.

Mr. QUIGLEY. That is all, Mr. Chairman.

The CHAIRMAN. You believe then, do you not, sir, that a poor law well administered is better than a good law poorly administered?

In other words, if we proceed with a law that isn't perfect but we have excellent administration of it, we will get good results?

Dr. PICKERING. Yes, sir.

The CHAIRMAN. Without the need for changes very often, is that correct?

Dr. PICKERING. Yes, sir; I think I would agree with that.

In other words, let me say that if you attempted to completely rewrite the law, whether or not that would effectively produce a good program is still going to depend on the people at the various management levels within the Department of Defense and other branches of the Government and how well they are going to carry out the intent of national policy in this regard.

In other words, if I ask the question right now as to how much am I concerned with Department of Defense versus NASA, lack of cooperation, I can indeed see examples where potentially there is lack of cooperation, I can obviously see examples at the working levels where I find disagreements as to how to do things. This is true within my own engineering organization, let alone two large and separate groups.

What I would like to see is agreement at the top level as to what are the real objectives of each activity and are these objectives really coordinated into a sensible national program.

The CHAIRMAN. We certainly thank you.

Any further questions? [No response.]

Doctor, you have made an excellent statement and we certainly appreciate your coming here to advise us. May we continue to consult with you, sir? You have such an outstanding name in science, you have done such a great job that we would like to know that we could continue to get your advice and counsel.

Dr. PICKERING. Yes, indeed. If there is anything I can do to help the committee, I will be glad to cooperate.

The CHAIRMAN. You have come a long way and done a good job.

At 2 o'clock we promised to hear Congressman Chet Holifield for a short statement. He has written the committee a very long statement and I suggested to him that instead of having a long statement we just have a short oral statement from him. He will be here at 2 o'clock, following which we will take up the report.

We want to thank you again Doctor, for coming here, and the committee stands adjourned until 2 o'clock.

(Whereupon, at 12:06 p.m., the committee was recessed, to reconvene at 2 p.m., the same day.)

AFTERNOON SESSION

The CHAIRMAN. Several days ago Mr. Chet Holifield, Congressman from California, a member of the Government Operations Committee, and also the Military Procurement—is that a Joint Committee on Military Procurement or what is that that you are a member of?

Mr. HOLIFIELD. Mr. Chairman, I am the chairman of the Subcommittee on Military Operations of the House Committee on Government Operations.

The CHAIRMAN. Yes, but I am talking about the other Joint Committee.

Mr. HOLIFIELD. On the Joint Committee on Atomic Energy I am chairman of two subcommittees, the Special Subcommittee on Special Radiation and the Subcommittee on Legislation.

The CHAIRMAN. I have known Mr. Holifield for years. At one time he was on the Armed Services Committee. He left for greener pastures. Mr. Holifield wrote me a letter several days ago, a five- or six-page closely written letter, and I suggested that rather than attempting to get the committee acquainted with the contents of the letter that he come over here personally and make a short statement to the committee to give us his viewpoint regarding the proposed patent revisions to the Space Act. Following that we will go into executive session and hear the subcommittee report. Mr. Mitchell was chairman of the subcommittee.

Now, Mr. Holifield, we are glad to have you. You have a prepared statement. Would you like to take it up?

Mr. HOLIFIELD. Yes; I would.

The CHAIRMAN. The members of this committee understand that you have another committee standing by and that you want to leave as soon as possible after finishing your statement.

Mr. HOLIFIELD. That is right. I don't wish to preclude pertinent questions, but I would like to be excused by 15 minutes till 3, if it is possible.

The CHAIRMAN. All right. You just proceed, sir.

Mr. HOLIFIELD. I have a short prepared statement, Mr. Chairman.

STATEMENT OF HON. CHET HOLIFIELD, REPRESENTATIVE IN CONGRESS, STATE OF CALIFORNIA

Mr. HOLIFIELD. Mr. Chairman and members of the committee, I wish to thank you for the invitation to appear here this afternoon and to discuss the subject matter of my letter to the chairman regarding proposed patent revisions to the Space Act.

All of you, I believe, have copies of the letter, and I can submit it for the record. It was not my thought to impose on your regular hearing schedule, since you are a very hard-working committee, but Chairman Brooks suggested that further discussion might be helpful, and invited me to appear and I thank you for your courtesy, Mr. Chairman.

Now, I am not a lawyer nor a patent expert, so my observations will have to proceed along general lines. I do have some rather considerable experience with this problem on the Atomic Energy Committee. I am scarred by many legislative battles with patent lawyers and industry spokesmen—I want you to notice that that

word is "scarred," not "scared"—[laughter]—but so far our committee has not given up the fight. We can count a few victories on our side.

The first thing we have to keep in mind is that in the space field we are dealing with a Government-financed enterprise on the frontiers of science. In these respects space exploration and atomic energy development are very much the same. The emphasis that has been given to the differences between these two fields is beside the point. In space exploration as in atomic energy, Government money "makes the mare go."

In fact these two fields of endeavor converge at strategic points. Just the other day before the Research and Development Subcommittee of the Atomic Energy Committee, it was stated that the real conquest of space would come about only with the development of nuclear engines.

My Subcommittee on Legislation has the job of authorizing the money for that particular project.

NASA has projected a space budget of $2 billion yearly for the near future. This spending rate will exceed that of the AEC, which has important weapon as well as nonmilitary responsibilities. We should be careful and cautious about any change in NASA patent measures when this agency has so little operating experience.

Of course, a hue and cry was raised about the patent provisions of the Atomic Energy Act from the very beginning. Eight or nine years after that law was enacted, we made some revisions in the patent sections, but the basic principles were retained.

We can argue all day long about the ways and means—and the difficulties—of deciding between the public interest and the private (contractor) equities, but I will take my stand on the public side and let the private contractor make a case for exceptional treatment—whenever he has a case.

Your subcommittee—with all due respect to its fine chairman, Erwin Mitchell—turns the thing right around. Under the subcommittee proposals, the Government would have to make a special case for taking title to patents, leaving most patents to private owners despite the fact that Uncle Sam gives them the wherewithal to go to work.

True, your subcommittee tried to soften the blow of this reversal by a statement of congressional intent—a statement—I want you to note that was written into the report and not into the bill.

This declaration—page 34–35 of the report—states certain conditions in which the Government would be justified in taking title to patents, but the opposing conditions laid down for private ownership of patents tend to cancel out the Government's rights.

Why do I say Government rights would be canceled out? Let's look on page 34 of the report where the elements are listed favoring retention of title by the contractor. Item B, for example, is exactly the "escape clause" which NASA wants to conform its patent provisions to those of the Department of Defense. The very basis of NASA's legislative proposal is the contention that it must take the DOD approach to facilitate its contracting. Under item B, practically all NASA contracts could be modeled on DOD patent provisions.

Or, take item D. The thought seems to be that an experienced contractor, who brings his knowledge to the contract work, is entitled to patents because of his technical contributions. But where, may I

ask, did space contractors acquire this technical competence in the first place? The space technology laboratories of big contractors were built up on the basis of Government-sponsored and Government-financed contracts.

If these criteria put forth by the subcommittee are valid, they should be written into the bill. If the evidence is still scanty, or the criteria as formulated are administratively implausible or contradictory, then we would do better to wait until there is more information on the whole subject.

That is why I believe that the patent provisions of the Space Act, as originally written into the bill under Mr. McCormack's direction, were soundly motivated. I don't mean to say that the patent issues were investigated or debated at great length. In the post-Sputnik days; speedy action was demanded, and the patent problem, I understand, was left largely to the last-minute deliberations of the conference committee on the space bill. The point I am trying to make is this: Because the patent issues were not altogether clear, Mr. McCormack and his colleagues took their stand on the side of the public. I believe we should stick to that position. We should wait until there is more administrative experience and specific information before we change NASA's patent provisions.

As you are aware, other congressional inquiries into the Government's patent policies are proceeding at this time. In the Senate Judiciary Committee, there is a Patents, Trademarks, and Copyrights Subcommittee, headed by Senator O'Mahoney. It has been working to provide the beginnings of some real evidence as to the facts of the patent system as it actually works. Such facts have been lacking for perhaps the life of the patent system itself. We have taken it for granted we are protecting free enterprise when we protect the patent system just as it has existed since the beginning, but, if the facts be known, perhaps the private monopoly with its original trappings and procedures has created just more private monopoly. We don't know. In any event, the Founding Fathers who wrote the patent clause in the Constitution were not confronted with Government-financed research or with the scientific endeavors undertaken almost exclusively to serve public needs; and at public expense, I might add.

In this last statement I made, I hope you will look at it again.

Before that Senate Patents Subcommittee, you will recall, came Judge Learned Hand in 1955. He admitted that the judges who decide the patent suits, who actually administer the extent of rights preserved by the patent system, did not know the facts, and were not really given the facts by the counsel arguing before them. He urged that committee to make a "very thoroughgoing investigation," and that is what it has been doing for the past 4 years.

Besides the preliminary reports of that subcommittee, which are reprinted in your own subcommittee report, it has published about 22 other studies, and annual reports as well.

I believe that subcommittee is getting to the stage of education where it can begin to examine more closely the policy of the Department of Defense with respect to patents.

There is also a Senate Small Business Subcommittee on Monopoly which has been examining the problems of Department of Defense contracting in relation to its effect on small business for some time,

and which held hearings last December after your own Mitchell subcommittee hearings. Apparently they have found enough evidence to convince themselves that patents were not inevitably beneficial to all small businesses. I am informed that Senator Long, chairman of that Monopoly Subcommittee, intends to speak out against Department of Defense patent policies, and the New York Times article of March 29, seems to bear this out.

Quoting from the two last paragraphs, and I offer the complete item, Mr. Chairman, for the inclusion in the record if you wish.

I read the last two paragraphs:

Recent statements by Democratic Senators Russell B. Long of Louisiana and Joseph C. O'Mahoney of Wyoming forecast opposition when the matter reached the Senate.

The NASA's research and development budget for 1961 is $821,400,000 and is likely to shoot up in the future. The total Federal bill is about $8 billion.

That is in research that we are throwing about $8 million into it annually.

(The newspaper article referred to is as follows:)

PATENT DISPUTE—A STUDY OF BIG DEBATE OVER TITLE TO RIGHTS RESULTING FROM NASA PACTS

(By Stacy V. Jones)

WASHINGTON, March 28—One of Washington's hottest debates, over ownership of patents resulting from Government research and development contracts, has been re-fired by proposed amendments to the Space Act.

The Administration and a House subcommittee would like to relax the requirement that the National Aeronautics and Space Administration take title to such patents. The pending administration bill to amend the act, introduced in the House by Representative Overton Brooks, Democrat of Louisiana, would do so.

Some contractors have refused to take NASA contracts because of the patent provisions, and others have done so reluctantly. In one case, the NASA was considering a design and feasibility study for a meter to measure gravity on the Moon's surface, to be used in instrumented "soft" landings. The company regarded as best qualified declined to bid.

Several other corporations have shunned NASA contracts, particularly when they felt their own prior work in related fields would be surrendered.

The Department of Defense has always let industry keep research and development patents for commercial exploration, retaining a free license for the Government to use the inventions. The Atomic Energy Commission, on the other hand, has always taken title to them. The respective procedures have been debated since 1947.

The patent provisions of the 1958 law setting up the Space administration were modeled on those of AEC, but gave the Administrator the authority to waive Government rights if he could show that "the interests of the United States will be served thereby."

NASA officials feel handicapped by the attitude of making joint contracts with the AEC or the Pentagon. They want discretion to acquire title or not, and in testimony have shown preference for the Pentagon system.

The two opposing views are these:

1. Since the Government pays all the expenses of research and development it should own all the resulting patents, in behalf of the people, and give the widest circulation to the technical knowledge they contain. Leaving them in the contractors' hands increases the monopoly hold of big business.

2. The Government should never own any patents. It does not enforce those it owns, as patents, or get royalties from them. The best interests of the country and private enterprise are served by leaving them in the hands of industry.

On the Government ownership side are a good many Members of Congress, including influential committee chairmen, and certain economists.

IMPORTANT INVENTIONS

Ranged against them are industry, the patent bar, other Members of Congress, and a good many officials, including Robert C. Watson, the Commissioner of Patents.

At stake are inventions of potentially enormous importance to industry arising from nuclear discoveries and space developments. They may revolutionize, among other things, power, transportation, and communication.

Representative Brooks, chairman of the House Committee on Science and Astronautics, appointed last year a subcommittee of seven lawyers to study the NASA patent section. The subcommittee, headed by Representative Edwin Mitchell, Democrat of Georgia, held the premise the "Government pays—Government must own" was specious, and approved the proposed amendments already embodied in the Brooks bill. It recommended minor charges, one of which would require the NASA always to get a license for the Government. The full committee will consider the bill this week.

Recent statements by Democratic Senators Russell B. Long of Louisiana and Joseph C. O'Mahoney of Wyoming forecast opposition when the matter reached the Senate.

The NASA's research and development budget for 1961 is $621,400,000 and is likely to shoot up in the future. The total Federal bill is about $8 billion.

Mr. HOLIFIELD. I want to make it very plain today that I am not attacking the patent system. Someone might think from reading this that I am, but I want you to know that I am not confining my remarks to a special segment of the patent application to governmental financed projects—these studies point to the need for uniform patent policy in the Federal Government. Also, they suggest that there is advantage in some cases to encouraging freely and widely usable inventions instead of granting a private patent monopoly. This is perhaps one of the reasons for spending Government money for research and development.

The Department of Defense, which is the biggest spender of Government money, has no patent law to guide it. The DOD makes its own law, known as ASPR, and it has developed a rationale for sidestepping the difficult administrative problems of deciding between the public interest and private equities. It simply lets the contractor acquire ownership of patents.

I believe it is high time that this rationale is reexamined. Patent policies among the Federal agencies are in a most confused and confusing state, and undoubtedly that is what led to a growing awareness in the executive branch as well as in the Congress that more information is needed in this field.

Right now, the Commissioner of Patents, Mr. Watson, in his capacity as head of an interagency study group on patents, has a contract going with the Patent Trademark and Copyright Foundation of George Washington University in an effort to obtain more data for evaluation of patent policies. His study group is one of the remaining holdovers from the Inter-Agency Task Force on Government Procurement Policies, which was abolished last October. The remainder of the task force has been reassembled under a new Assistant Administrator in the Federal Services Administration. Presumably because the problem just can't be buttoned up with the present state of knowledge, and because there are no others in the executive branch who could shed any more light on the area, the patent policy study group works on, perhaps hoping to present a draft of a Federal procurement regulation to the new Assistant Administrator.

It is notable, too, that the Attorney General has often not seen eye to eye with the Department of Defense and other departments which

would like to sweep the problems under the rug and keep their cozy relationships with the contractors.

As the record of your own subcommittee indicates, the Attorney General spoke out, in 1947 and again in 1956, against the DOD policy of taking only a license to inventions made in the course of research and development contracts.

My experience on the Atomic Energy Committee tells me that stringent patent requirements are no real bar to accepting Government work. The AEC has the top corporations of the country on its list, and these companies do work for many other Government agencies, all with varying patent policies. If these contractors can live with the AEC—and they manage to live well—they can also live with NASA.

And I have here in the annual report of the Atomic Energy Commission for 1959—on page 285 of that report it is indicated that the AEC has 46,642 contractors in research and development—46,000. They are not having any trouble at all, gentlemen, finding people to do the work. Any time they put up a contract you would be surprised how many bidders they have to bid on those contracts.

There has never been a dearth of contractors to bid, I assure you.

As I suggested in my letter, the examples cited in your subcommittee report (pp. 29–31) of companies refusing to contract with NASA seem to me rather unconvincing. Four of the seven companies listed as objectors are also listed as AEC research and development contractors, and you can find that list either in the AEC annual report or in the December hearings of the Senate Small Business Subcommittee (p. 247). The other three, for all we know, may have AEC subcontracts. I would also note that many firms have found it very much to their advantage to perform research and development work for the DOD and the AEC at the same time.

The real issue, it seems to me, is not whether NASA contractors should be on a par with DOD contractors, but whether private companies let in at the ground floor should be enabled to stake out strategic monopoly positions for commercial exploitation on the basis of Government-financed business. This issue is particularly acute in new fields of endeavor brought about by Government needs. It applies to atomic energy; it applies to space exploration. As a commonsense proposition, I cannot believe that the patent approach sought by NASA will help small business or promote competition. If, as your subcommittee seems to believe, small business needs the patent privileges more than big business, then arrangements could be made for waiving Government rights to patents developed by bona fide small firms.

In conclusion, let me call your attention to the practice of private industry in the patent area—i.e., the employer-employee relationship. The employer takes title to employee inventions. I believe the Government's relationship to its contractors should be examined in this light.

And here I would like to interpolate this additional material.

As a matter of fact, the Government is strict in its relations to its own employees, in its own Government plants. It requires assignment of patentable ideas to the Government from its employees, if conceived within the scope of employment.

Of course, it has the waiver privilege in that as you do have in the Atomic Energy Act and in the NASA Act.

That concludes my statement.

(The letter referred to is as follows:)

CONGRESS OF THE UNITED STATES,
March 28, 1960.

Hon. OVERTON BROOKS,
Chairman, Committee on Science and Astronautics, House of Representatives, Washington, D.C.

DEAR MR. CHAIRMAN: I am advised that your Science and Astronautics Committee has under consideration and soon will report out legislation proposing amendments to the National Aeronautics and Space Act of 1958.

Included in this bill are revised patent sections to permit NASA to conform the patent clauses of its research and development contracts to those of the Department of Defense, which has no statutory guide for patent policies and procedures. As presently enacted, the patent provisions of the Space Act are akin to those of the Atomic Energy Act of 1954, as amended.

In brief, NASA representatives believe that they are obligated under present law to retain title in the name of the Government to most inventions developed under Government-financed research and development projects, and that this statutory policy of vesting title in the Government handicaps NASA in dealing with its contractors. The contention is that contractors doing similar work for NASA and the Department of Defense are confronted with opposing patent provisions of the two agencies; and that there is more incentive to accept military work. This is ascribed to the fact that prevailing DOD policy lets contractors take title to inventions arising from Government-financed projects, subject only to granting to the Government a nonexclusive royalty-free license.

As a member of the Joint Committee on Atomic Energy since the creation of the committee in 1946, I have been an active participant in the development and modification of statutory provisions governing atomic energy patents. Sometime ago I discussed patent matters briefly with Mr. Mitchell, whom you appointed chairman of a Subcommittee on Patents and Scientific Inventions. Mr. Mitchell told me about the hearings held by your subcommittee, and subsequent to our conversation, I had an opportunity to look at the hearing record.

A very vocal and articulate group of patent lawyers and contractors' representatives has definite and unvarying opinions on this subject, and it appears that the subcommittee was guided largely by the weight of their testimony in urging a shift from Government to private vesting of title. While the Atomic Energy Commission witness, Mr. Roland Anderson, made a good presentation explaining the public interest considerations in the Atomic Energy Commission patent policies and procedures, I believe that the public interest aspects of this controversy were heavily overweighed by the testimony of those who have a self-serving interest in changing NASA patent law and policy.

There was a line of reasoning in the testimony, accepted by the subcommittee, that atomic energy was sufficiently different in origin and impact from space activities to justify different patent policies. It should be clearly understood that practically all of the industrial and patent attorney witnesses are just as opposed to the patent provisions of the Atomic Energy Act as they are to those of the National Aeronautics and Space Act.

Among the AEC contractors are several hundred of the largest companies in the United States, practically all of whom also hold contracts with military agencies. It is evident that these contractors can live with the patent provisions of the Atomic Energy Act even while doing business with the Department of Defense.

There was testimony in the record to the effect that a policy of Government retention of title to patents would result in increased costs. That is to say, the Government would have to pay higher contract costs for retaining this right rather than giving it to the contractor. Like so many other matters in the patent area, such arguments have no real and concrete evidence to support them.

My own belief is that Government contract negotiators would not be able to allow hypothetical costs to contractors for foregoing patent rights. Neither do I fear that talent and resources would be withheld from the Government by virtue of title reservations in the Government. The DOD has argued repeatedly that it would be disadvantaged by taking title, but I am positive that

among all the incentives for or against accepting Government work, private industry is not impelled primarily by patent considerations.

The fact of the matter is that Government contracting in defense and related space activities as well as in atomic energy is dominated by big corporations, and none of them is in a position or has the least desire to stand aloof from Government-sponsored and Government-financed activities. Not only is there no risk to the company in such activities, but it may be vital to the company's future to participate.

Efforts at the subcommittee hearing to get some specific evidence of companies turning down NASA contracts apparently were unsuccessful. However, I note in the subcommittee's report at pages 29–31 that seven cases were cited either of company rejection of, or difficulties in making, a contract with NASA because of the patent clauses. If I am not mistaken, at least four of these companies now have, or have had, contracts with AEC, which has more rigorous patent requirements in some respects than NASA. Consequently, I fail to see the cogency of the material submitted by NASA. I would have liked to see these examples examined closely rather than included in the report as ex parte items in favor of revision of the patent sections of the Space Act.

Your subcommittee noted situations or criteria which would justify Government retention of title to patents, but it preferred to let the legislative intent be stated generally in the report rather than prescribed in the act. If these criteria are valid, certainly they deserve legislative form.

Generally, your subcommittee's approach is to reverse NASA patent policy, so that Government title would become the exceptional case. Under existing law, Government title is the usual case, with waivers permitted at the discretion of the Administration.

The effect of this reversal would be to push NASA toward the DOD policy of not taking title at all (I omit those few instances when Government title is taken in the absence of private patent action merely as a precaution against possible suits). In fact, NASA wants the legislation for the very purpose of accommodating itself to DOD policies. If the proposed legislation did not allow NASA to line up its policies with those of DOD, NASA would not be supporting the legislation.

Such a reversal, in my opinion, would be a step backward. A good case can be made for bringing the DOD in line with the existing NASA statute rather than the reverse. The DOD will of necessity be increasingly concerned with space exploration and space weaponry.

Admittedly your subcommittee did not have a mandate, nor did it attempt, to prescribe patent policy for the whole range of Government agencies involved in contracting, but the burden of its recommendations to accommodate NASA and DOD patent policies may conflict with simultaneous or subsequent congressional attempts to develop uniform policies. In other words, the NASA patent proposals, though presented as a matter of administrative convenience in contracting, go against the grain of more comprehensive congressional action, unless we assume that the DOD policy is best for the whole Government. I cannot subscribe to this assumption.

In this connection, studies of the Senate Judiciary Committee and Small Business Committee in the patent field do not necessarily point in the same direction as the recommendations of your subcommittee. Both committees in the Senate have been devoting considerable effort to the problem of legislative standards for patent administration by the DOD rather than to the release of such agencies as NASA from present legislative requirements. Also, a special panel of the Inter-Agency Task Force on Procurement is engaged in studies to determine whether more uniform patent policies should be adopted among Federal agencies and particularly whether public interest considerations dictate the taking of Government title to patents arising from Government-financed research and development.

It is my belief that, in the long run, competition will be stronger and consumer benefits greater if the Government follows a course of making inventions in Government-financed research and development, particularly in strategic technical areas, freely available to all who may wish to practice them. This is no reflection on the traditional patent system. That system related progress in science to exclusive patent privileges, but it did not contemplate that the taxpayers would put up the funds for doing the work or that some areas of work would have such transcendent importance to the security and welfare of the Nation. Considering the huge commitments of the Government for scientific

and military programs, the incentive to contractors is the Government money and the prestige, not the patent privilege.

I daresay that industrial spokesmen and their patent attorney advisers are asking for privileges which they do not accord to their own employees and, in some cases, their subcontractors, if I understand this situation rightly. The employee of a corporation who invents something assigns ownership rights to his employer and has his own incentive either in some form of award, enhanced reputation, increased job opportunities, or other benefits.

It seems to me that the better part of wisdom would be to hold the NASA patent proposals for further consideration at a later time when more information is available on the public interest implications of prevailing policies and when a uniform patent policy can be worked out. The select committee's approach to the patent problem in the original enactment of the Space Act was soundly motivated in the sense that the public interest was the foremost consideration. I would hope that there is no hasty reversal of this approach.

If your committee reports out a bill with amendments to the patent sections along the lines requested by NASA or suggested by the subcommittee, I must respectfully advise you that I will in good conscience consider it necessary to oppose them on the House floor.

Sincerely yours,

CHET HOLIFIELD,
Member of Congress.

The CHAIRMAN. That is a fine statement, Mr. Holifield. We appreciate it very much.

Now, we promised to get Mr. Holifield away in ample time. He has time—if there are no questions. We want to thank you and we want to study this, and we want to get the report of the study before we do much interrogating.

Mr. HOLIFIELD. Mr. Chairman, I have a few minutes before I have to go to the other committee. If there are some questions that some of your members have—I don't want to preclude questioning. I never like to see a witness come before a committee and make a statement and then be allowed to run out without answering any questions.

The CHAIRMAN. You are very nice to be willing to do that.

I will tell you what we will do. Mr. Mitchell is more familiar with this as chairman of the subcommittee. We will just recognize Mr. Mitchell.

Mr. MITCHELL. Thank you, Mr. Chairman.

Let me state to the members of the committee something about the gentleman from California. This is something that he feels very strongly about. We talked about it previously, and certainly he makes a most persuasive argument in behalf of his position. Certainly it is motivated by a most sincere interest on his part in presenting it to us.

Of course, as Chet knows, we absolutely disagree.

Mr. HOLIFIELD. I am not surprised.

Mr. MITCHELL. Now, Mr. Holifield——

Mr. HOLIFIELD. Yes, sir.

Mr. MITCHELL. There are very few things—I won't say "very few," but there are not too many things in your statement with which I disagree. But it seems to me you are not getting right down to the basic issue.

What is the advantage in the Government owning title to these inventions?

Mr. HOLIFIELD. Well, the advantage that we found in the Atomic Energy Act has been that the Government has claimed approximately 2,000 patentable ideas which it has paid for with its own money in research and development, and immediately made them available to

all of the contractors in industry, and to the general public as well, on the grounds that not only are the contractors that happen to have a Government contract entitled to it, but it was paid for with Government taxes and should immediately be given to all of the people.

Mr. MITCHELL. All right. Now, this is the crux of the whole problem, isn't it: Your theory is that if the Government owns them they will be made available to all of the private companies and, therefore, will be dispersed and may be cheaper than if there is a patent granted to a company?

Mr. HOLIFIELD. It is not only cheaper, but it allows the art to spread in a vital field of national defense. We found in the Atomic Energy Act, and you will find the same thing in space, that between 10 and 20 of the large corporations will have the bulk of the contracts and 90 percent of the patents. If there is a free exchange of ideas, with the Government as a clearinghouse between those corporations, the chances are that you will get a faster application of new technology to this very vital defense field than if you allow companies to go through the normal procedures of patenting the inventions that they have obtained with Government money.

Mr. MITCHELL. I may say this to you and I want the members of the subcommittee to speak up if I am incorrect. I think when we first undertook these hearings, that probably each member of the subcommittee held the same view that you do until we heard the testimony.

Now, I think I am speaking for Mr. King in particular. We heard witness after witness. Now you mentioned the hearings of the Senate; Senator O'Mahoney, as I recall, has held no hearings whatsoever; has he?

Mr. YEAGER. Not on this particular issue.

Mr. HOLIFIELD. He has had hearings on the general subject of patents.

Mr. MITCHELL. But not on this particular issue.

Mr. HOLIFIELD. May I comment on the fact that most of your witnesses testified against the Government having these rights? Of course they did; it is to their self-interest to do so. We found the same thing true in the atomic energy field, and yet when we put a 5-year limitation on our patent law to look at it again at the end of 5 years, we found very little opinion on the committee on either side of the political fence that it should not be renewed.

We found out that it had not handicapped the advancement of the art and there was very little interest in not renewing it; in other words, in allowing this patent provision to die, so we renewed it for another 5 years.

Mr. DADDARIO. Will the gentleman yield?

Mr. MITCHELL. In just one moment, Mr. Daddario.

Mr. Holifield, the important thing I get from your statement, and from the letter which you sent to the chairman and to each of the members of the committee, is that by letting the Government have title to these patents, you say information will be dispersed, and be more readily available, and you cite the AEC as an example.

Now, our figures show that the Atomic Energy Commission now has some 2,500 patents, but that less than 400—there have been less than 400 requests for licenses of these patents. So isn't that inconsistent with your position?

Mr. HOLIFIELD. Wait a minute. There have been over 2,000 of them thrown on the open market which are available.

Mr. MITCHELL. Are available?

Mr. HOLIFIELD. Are available.

Mr. MITCHELL. But are they being utilized?

Mr. HOLIFIELD. If they are needed. Of course, this is in a specialized field, as your space patents will be in a very specialized field with a very few major contractors. There may be many subcontractors, and you cannot judge the problem in the way you are judging it.

Now, are you speaking perhaps of applications for compulsory—asking the AEC to exercise the compulsory licensing clause which it can exercise in the case of private companies who have acquired patents because of AEC waiver?

You see, there is a clause in the AEC Act, and the AEC does not pick up all the patents by any means; it only picks up the patents that it thinks are important. And there is a clause that any person who does pick up a patent in the atomic energy field must make it available to others on a compulsory licensing basis on application to the AEC.

I am not familiar with the figure that you give, but I would ask you if that is not applicable to that phase of it?

Mr. MITCHELL. Our information is that there have been less than 400 requests for licenses out of the 2,500 patents which the AEC owns; and, when they have been granted, in many instances they have never been utilized.

Mr. HOLIFIELD. This is true in all of industry. Industry only asks for those patents that it needs and particularly when they are thrown on the open market. After they have been released to the open market, there is no point in them asking the AEC for them; they already are made available to them.

Mr. MITCHELL. We heard, and I know that you read in the hearings, time and time again the patent people saying: "What is available to all is worth nothing to anyone."

Mr. HOLIFIELD. It is worth nothing from the standpoint of royalty, but it is certainly worth something from the standpoint of utilization in manufacturing.

Mr. MITCHELL. I don't subscribe to that entirely, but you heard that repeated throughout——

Mr. HOLIFIELD. I have heard that in AEC hearings, too. Of course, it is to their special interest, but one of the reasons that we adopted this language in the first place was because we knew that there would of necessity be a limited number of companies that would participate in the field and we thought that it was wrong—I will use a few names just at random—we thought it was wrong to let the General Electric Co. have a body of patents in the field to the discrimination of Westinghouse and Monsanto Chemical and Babcocks and Wilcox and others. We thought just because they happen to have a contract in a specific field, which was a new scientific field, that they should not be given, in addition to their compensation, windfall patent equities and deny the rest of American business. We were trying to be fair to all business in this limited field.

Mr. CHENOWETH. Would the gentleman yield?

Mr. MITCHELL. I believe I promised to yield to Mr. Daddario.

Mr. DADDARIO. Do you want to pursue this particular point?

Mr. CHENOWETH. Just one question.

Seeing my distinguished friend from California, you propose then to abolish the patent system?

Mr. HOLIFIELD. No.

Mr. CHENOWETH. That is what you do.

Mr. HOLIFIELD. Oh, no.

Mr. CHENOWETH. That is what you propose to do here.

Mr. HOLIFIELD. No, I propose to maintain the principle of the patent system——

Mr. CHENOWETH. You are taking that invention protection away from him—

Mr. HOLIFIELD. No.

Mr. CHENOWETH. Oh, yes.

Mr. HOLIFIELD. Oh, no.

Mr. WOLF. If the gentleman will yield.

Mr. HOLIFIELD. Just a minute. I can answer the question if the gentleman will let me.

Under the American system of patents the man who pays for research and development is entitled to contract for and receive the patent. That is the American system.

Mr. CHENOWETH. No, that is not; you are talking about what may be the policy of some group.

Mr. HOLIFIELD. No.

Mr. CHENOWETH. But that is not the patent law; that is not written into the law.

Mr. HOLIFIELD. Wait a minute. A man who goes into court——

Mr. CHENOWETH. A man who invents something gets protection for 17 years; that is the only purpose of the law, to give him that protection which you are now taking away from him.

Mr. HOLIFIELD. No.

Mr. CHENOWETH. You are taking it away from him in AEC.

Mr. HOLIFIELD. No.

Mr. CHENOWETH. You just told us——

Mr. HOLIFIELD. No, if the gentleman will yield——

Mr. CHENOWETH. Cover the whole waterfront——

Mr. HOLIFIELD. If the gentleman will yield for an explanation without interruption, I will tell the gentleman exactly my position.

My position is that if the General Electric spends its money it should have the right to contract for patent rights with its employees and contractors. I take the same position that General Electric takes in regard to one of its employees. When the General Electric hires a man to work for him, that man signs a contract that any idea that he gets that is patentable during that term of employment belongs to General Electric because General Electric is putting up the money.

I am asking that that same principle be applied when the Government puts up the money and has a contractor working for it, that the Government is entitled to the title to the patent just the same as General Electric is from its employees.

Now, that is the American principle and that is what I am standing for.

Mr. CHENOWETH. It is not for the patent system.

Mr. HOLIFIELD. Oh, yes, it is.

Mr. CHENOWETH. It is compulsory——

The CHAIRMAN. Mr. Mitchell, you yielded to Mr. Daddario.

Mr. DADDARIO. Mr. Holifield, you see no difference, as I understand it, between the space field and the atomic energy field?

Mr. HOLIFIELD. Well, there is very little difference. The atomic energy field was a completely new area of science. It was a field where there was no knowledge before we started into it, and it was completely Government financed.

In the case of space, this is also a new area of science and it is completely Government financed. So the basic things are just—the basic principles involved are the same.

Mr. DADDARIO. You don't subscribe, then, to the proposition that in the first instance the atomic energy development was a newborn creature completely supported by Government funds.

Mr. HOLIFIELD. I do.

Mr. DADDARIO. And that in the space field you have a step-upon-step development of what is, in essence, the development of the airplane, going from the airplane through to the high-altitude planes.

Mr. HOLIFIELD. No, sir, I think you are completely wrong.

Mr. DADDARIO. To your——

Mr. HOLIFIELD. I think you are completely wrong in that assumption. I think your space field, contractors in space are exploring a new science just as the contractor did in the atomic field.

Mr. DADDARIO. And you don't believe any information or knowledge and research and development that they put into any of these other fields insofar as getting a vehicle off the ground and into the air is helping them at all, that their engineers had to learn all over against how to do this job.

Mr. HOLIFIELD. No; I don't take that absurd position.

Mr. DADDARIO. You say it is an entirely new proposition.

Mr. HOLIFIELD. No. I said it is new just as the atomic science was new.

There were contractors and manufacturers who utilized the background of information in coming into the atomic development field just as there are in space. But I point out to you that in those areas that were patentable the companies had those patentable ideas and have patented those ideas and I do not advocate taking any of their patentable ideas away from them, that they have acquired hitherto to taking on a Government contract for research and development in a specific field where tax moneys are spent. And that any result of that—all results of that, all beneficial results of the expenditure of public tax moneys should belong to the public.

If they spend their own money, it belongs to them.

Mr. DADDARIO. Won't you concede that there is a mixture of funds at least both private funds and public funds in this whole space field; that there is a great deal of difficulty in differentiating the one from the other, and that if the thread can be carried back to the proper place that, even though there may be some Government funds expended, that the patent should lay with that particular company?

Mr. HOLIFIELD. It isn't a matter of some Government projects being developed; it is a matter of research and development project where Government funds finance this project, and if the case is that——

Mr. DADDARIO. Could I give you an example——

Mr. HOLIFIELD. Then the Government has it. If it is a 50–50 meeting of funds, and I dare say there will be less than 1 percent of your

space contracts that will be on that basis in research and development, and I know of none in atomic energy that are on the basis of a grant 50–50- or 90–10-percent grant.

Mr. DADDARIO. May I pose a question and let me see just how you would handle this kind of a situation?

Mr. HOLIFIELD. All right.

The CHAIRMAN. Just a moment. The gentleman said he wanted to get back by a quarter to.

Mr. HOLIFIELD. A quarter to three. I don't want to impose on the committee.

The CHAIRMAN. Three more minutes.

Mr. DADDARIO. You have a captive industry that has all of its work with the Government, every single cent. Let's say, it makes a 4- or 5-percent profit. It takes this profit from Government work and it puts it into experiments, research and development in an area that is very close to what it is doing, but that may have some commercial application to it.

It develops something and it is successful. Who would you give the patent to?

Mr. HOLIFIELD. If the idea was developed with private funds, I would give it to the private company. If the idea was developed with Government funds, I would give it to the Government for the release to all of industry in order to be fair to all of industry.

The CHAIRMAN. We have a couple more minutes.

Mr. Fulton, you had some questions.

Mr. FULTON. Very short.

There is a question as to the difference between atomic energy field and space, because atomic energy deals with a process while space is a place, like atmosphere, ground, water, and it is in a different context.

The second thing is this: You have seen, in your wide experience, the two extremes. One by the patent lawyer associations that want all the patents to be in private hands, in the corporations and you have the other extreme position; that is, that the patents, when there is Government money in an R. & D. contract, shall be Government patents.

Now, if you make a compromise, which this recommendation of the subcommittee certainly is, don't you think that this is a pretty successful compromise?

Mr. HOLIFIELD. No, sir; I do not. The whole burden is——

Mr. FULTON. I have looked it over and I think it is a pretty successful one.

Mr. HOLIFIELD. The gentleman is surely entitled to his opinion. My opinion has been expressed in my statement. I do not think it is a fair compromise. I think you are in effect taking public moneys and transferring special benefits to selected corporations at the discrimination of other corporations and I would like to answer the first part of your assumption and say that I would deny that your assumption is correct, that—there is nothing mysterious about space.

We will have nuclear engines in space and part of my job as chairman of the authorization committee is to furnish the research and development for the space engines for nuclear——

Mr. FULTON. Yes, but——

Mr. HOLIFIELD. And the patent provisions apply there just as they apply to other phases of the work whether in space or on the ground.

Mr. FULTON. You see the point is, at what point above the Earth's surface would you change the rules of practice for space?

Mr. HOLIFIELD. I have no interest in how far above the Earth's surface a gadget goes, if the gadget is invented on the ground by Government money. Your question, in my opinion, sir is irrelevant to the issue.

Mr. FULTON. You are against the compromise, then, but if a compromise were made, you don't think this is too bad a compromise?

Mr. HOLIFIELD. No, I am not advocating a compromise; I am advocating the original language of the NASA Act——

Mr. FULTON. I am not——

Mr. HOLIFIELD. You are asking an "iffy" question. I am against making any further compromise than is made in the original NASA Act.

Mr. FULTON. That is all.

The CHAIRMAN. Any more questions? It is a quarter to 3.

Mr. MITCHELL. May I make one brief comment while Mr. Holifield is here in all fairness to him?

The CHAIRMAN. Make it brief, because I have been told by members of the subcommittee that they will not be present when we get to your report unless we get to it right away.

Mr. MITCHELL. I just want to state——

The CHAIRMAN. I am going to recognize the Republicans here for all the time they want when we finish. I tried to be fair here.

Mr. CHENOWETH. I want to ask Mr. Holifield just one question.

The CHAIRMAN. Yes. I don't hold back on anybody.

Mr. Mitchell?

Mr. MITCHELL. Mr. Holifield, see if this concisely states the issue. Now, if as a result of Government money something is invented and there is an advantage to the American people, the Government should take title. That is your position; is that right?

Mr. HOLIFIELD. Yes.

Mr. MITCHELL. But, on the other hand, if there is no advantage in the Government taking title, then the position of the subcommittee report is correct; is that right?

Mr. HOLIFIELD. No. Whether there is an advantage to the Government or not, if there is an advantage to the American people they should be protected.

Mr. MITCHELL. When I use the word "Government," I mean the American people because that is the Government.

Mr. HOLIFIELD. If you are using it in that term. I thought you meant the Federal Government.

Mr. MITCHELL. No.

The CHAIRMAN. Mr. McDonough.

Mr. MCDONOUGH. Just one point, Chet.

In your proposal that the Government retain all of the patentable ideas——

Mr. HOLIFIELD. That it pays for.

Mr. MCDONOUGH. That it pays for and then, in turn, licenses to the public for the use of those patents.

Mr. HOLIFIELD. No, that isn't my proposal.

Mr. McDONOUGH. How does the public get the benefit of them if the Government retains the patent?

Mr. HOLIFIELD. The Government does not retain it. The AEC has thrown into the free area of industry over 2,000 patents, made them available to industry free; it doesn't license them or anything like that. It just furnishes all of the information and says, "You have a right to use it; your money paid for it," that is all.

Mr. McDONOUGH. Has that spread the art, too?

Mr. HOLIFIELD. It has.

Mr. McDONOUGH. To a great degree—of course, you had no other career experience; you only had that one procedure.

Mr. HOLIFIELD. We have had extensive experience in the spending of about $14 billion in the atomic energy effort and there has been no scientific project that has advanced as fast, in my opinion, as the atomic energy project in the years that it has been operating.

Mr. McDONOUGH. And if an individual picks up any one of these patents that are available from AEC, there is no royalty paid for them.

Mr. HOLIFIELD. That is right. In the English system the Government charges a royalty, but the American system makes it free.

The CHAIRMAN. Mr. Chenoweth?

Mr. CHENOWETH. I want to say to my good friend from California that nothing I am going to say is going to tarnish any of the affection which I have for him, deep affection.

Mr. HOLIFIELD. I have a deep affection for the judge. We served years ago on the same committee.

Mr. CHENOWETH. I want to say this unequivocally and categorically that I think you are 100 percent wrong. My views are diametrically opposed to yours, and if you had the time, I would challenge you to present to this committee one single case where it would benefit the U.S. Government to take title to a patent.

You don't have time now, but give that a little thought. We had the leading patent lawyers here for a week and not one of them came up with a single thought.

Mr. HOLIFIELD. I have given 14 years of thought to it.

Mr. CHENOWETH. You may have a good philosophy, but you are wiping out the patent system under which we have developed the greatest industrial nation on earth.

Mr. HOLIFIELD. I deny that charge.

Mr. CHENOWETH. You admit you are doing it.

Mr. HOLIFIELD. No.

Mr. CHENOWETH. You don't let the man who invents this article enjoy it——

Mr. HOLIFIELD. No, the gentleman must read my statement very carefully to find my real meaning.

The CHAIRMAN. Mr. Riehlman, Mr. Bass.

Mr. RIEHLMAN. No questions.

Mr. BASS. No questions.

Mr. WOLF. I merely want to congratulate the man for staying so long under fire.

Mr. HOLIFIELD. I wish I could stay longer but I know you have important work to do.

The CHAIRMAN. We are very happy to have had you.

Mr. QUIGLEY. Mr. Chairman, I would like to take advantage of Mr. Holifield's appearance here and the opening of the record to insert in the record of the full committee certain letters with industry that I have had subsequent to the closing of the record before the subcommittee, which I think in full and complete fairness to American industry should be spread upon the record.

There were certain inferences that could in effect be construed as unpatriotic motives on the part of American industry that bothers me if they were allowed to stand.

The CHAIRMAN. Perhaps the gentleman would like to submit that able statement he sent to all the members of the committee today.

Mr. QUIGLEY. This doesn't bother me so much as getting the correspondence that I had subsequent to the closing of the record inserted at this point.

The CHAIRMAN. No objection to it.

(The material referred to follows:)

DECEMBER 22, 1959.

NATIONAL RESEARCH CORP.,
Cambridge, Mass.

GENTLEMEN: During the recent Congressional Patent Subcommittee hearings, numerous witnesses expressed the opinion that it was the policy of many American industries to reject research and development contracts with the National Aeronautics and Space Administration because of the patent provisions contained in the NASA act as passed by Congress in 1958.

Recognizing the seriousness of such a situation—if in fact it does exist—I attempted in general throughout the course of the hearings to have the witnesses document this opinion. One witness, Robert Whiting, appearing on behalf of the American Patent Law Association, did volunteer to submit for the record the names of companies who did, in fact, pursue such a policy.

In a letter dated December 16, addressed to Congressman Erwin Mitchell, Chairman of the Patent Subcommittee of the House Committee on Science and Astronautics, Attorney Whiting stated in part as follows: "This is in response to the request of Congressman Quigley to me during my testimony for names of companies, willing to be named, as refusing contracts with the Government having provisions for assigning patents to the Government on inventions made during the course of the contract."

Attorney Whiting's letter then went on to say that "National Research Corp. of Cambridge, Mass., advises that it 'definitely will not seek, nor accept, contracts with NASA in certain fields of technology where complete denial of title to our inventions would place us in an unfavorable commercial position. While we do have some NASA contracts, they are not involved with technical situations where patent rights are considered to be significant.'"

In his letter, Mr. Whiting does not indicate who he is quoting but I think you will agree with me that this statement could be interpreted in a manner which would place your company in the position where it was not willing to contribute to this Nation's space efforts except on your own terms. Considering that this country is engaged in what may very well be a life and death race in space, it occurs to me that you would not want your company's position on such a vital national question to appear in the record solely on the basis of Mr. Whiting's statement—a statement which at best is hearsay testimony and which, due to circumstances over which Mr. Whiting had absolutely no control—he could not present to the committee in person and thus have it subjected to the usual safeguards afforded by cross-examination.

If it is your company's policy to refuse NASA research and development contracts because of the patent section of the NASA law, Members of Congress would be interested in knowing this fact. On the other hand, if there are factors other than patent considerations which affect your company's decision not to do business with NASA, this too the Congress should know. Under the circumstances, I venture to suggest that it would be wise if you would spell out specifically and in detail your company's exact position and policy on this very important matter.

In making this suggestion, I am aware that the record on the hearings in this matter closed on December 18. Nevertheless, I am certain Chairman Mitchell

and the other members of the subcommittee will appreciate it as much as I will in having the benefit of knowing your company's position made crystal clear.

Very truly yours,

JAMES M. QUIGLEY,
Member of Congress.

[EDITOR'S NOTE: A similar letter was sent to four additional firms. The replies follow:]

NATIONAL RESEARCH CORP.,
Cambridge, Mass., December 29, 1959.

Hon. JAMES M. QUIGLEY,
House of Representatives,
Washington, D.C.

DEAR MR. QUIGLEY: In response to your letter of December 22, 1959, I would like to advise that I wrote the letter to Mr. Whiting which was correctly quoted to you. I can assure you that National Research Corp. will certainly do whatever research work is essential to the furthering of the space effort.

I certainly appreciate your letter and the opportunity to clarify an unfortunate conclusion which you felt could be drawn from the statement in my letter to Mr. Whiting. As one who works daily with a small group of highly imaginative scientists, I have a very personal interest in seeing the United States overtake the lead of the Russians in the space age. I firmly believe that section 305 is an impediment to this effort for the reasons outlined below, and I sincerely advocate its repeal.

As patent counsel for National Research Corp., I must advise my client not to accept a contract from NASA where the act of accepting the contract will inevitably cause us to lose complete title to a patent application directed to an invention developed by us with our own funds. This is the situation referred to in my letter to Mr. Whiting.

Since the NASA statute requires vesting of title in the Administrator to any invention first actually reduced to practice in the performance of a NASA contract, this inevitably means that an applicant faces loss of title to his patent application (or even to his issued patent) unless he can prove that he actually reduced the invention to practice prior to the award of the NASA contract. I do not know what activity by an inventor would satisfy the Board of Interference Examiners to prove reduction to practice of a satellite solar cell, for example. It is quite possible that they would take the position that it had to be operated under conditions of pressure, temperature, and cosmic radiation which would be enormously expensive to duplicate exactly on the Earth's surface. Only the industrial giants can finance this kind of experimentation with their own funds. Certainly a small company such as ours could not possibly do it.

While the NASA statute permits waiver of title by the Administrator, the Administrator has issued regulations which do not permit granting of waivers prior to acceptance of a contract with respect to inventions conceived and embodied in previously filed patent applications. The waiver provisions also positively state that no waiver will ordinarily be granted with respect to any invention which is "primarily adapted for and especially useful in the development and operation of vehicles, manned or unmanned, capable of sustained flight without support from or dependence upon the atmosphere."

When we are faced, in a few limited fields, with the very real probability of loss of our total investment in an invention developed with our own funds, I cannot see how I can advise our company to seek or accept a NASA contract under the present statutory and regulatory provisions. Clearly, if there were an invention of such fundamental importance that its further development was essential to the space program, we would certainly deviate from this policy. This is not the case in the situation I have outlined above.

It is my firm conviction that section 305 of the Space Act will discourage small companies from seeking NASA contracts to further develop their privately financed inventions of potential utility in conquering space. At present the company which has progressed furthest, with its own funds, toward solving a problem of interest to NASA stands to lose the most by taking a NASA contract. The one most qualified technically to do a given job may thus have the least incentive to do it. This result hardly seems calculated to promote the best interests of the United States.

Again, I want to thank you for the opportunity to point out the specific reasoning behind my statement to Mr. Whiting. Your courtesy in this regard is certainly appreciated.

Yours very truly,

OLIVER W. HAYES, *Patent Counsel.*

CORNING GLASS WORKS,
Corning, N.Y., January 5, 1960.

Hon. JAMES M. QUIGLEY,
House of Representatives, Washington, D.C.

DEAR MR. QUIGLEY: Thank you for your letter of December 22 offering Corning an opportunity to directly state our feelings on the patent clause of the Space Act. I also appreciate the time you gave me on the phone yesterday.

First, Corning did make the statement which Mr. Whiting included in his letter of December 16, and it has been our policy not to accept the NASA patent clause.

This does not mean that Corning is unwilling to cooperate with NASA, quite the contrary. We are supplying the needed windows for Project Mercury. We have supplied a number of glass products to NASA and its prime contractors. At our own expense, we have taken a team of our top scientists to Langley Field and presented a very complete picture of our products and materials to the technical personnel at that center. During that trip we were able to supply scientific information which the personnel at Langley Field claimed helped them with some of their problems. This same sort of presentation will be made at Lewis Field as soon as we can arrange it. I think these actions, plus our many contributions to our defense program, definitely prove how sincere we are in winning this "life and death race," as you so aptly put it.

Corning does believe that the NASA patent provisions go beyond what is necessary to protect the best interests of the Government as it applies to our business. In saying this we wish to make it clear that we feel the present NASA personnel are trying their best to be reasonable in their interpretation of the act.

Specifically Corning has spent millions of dollars in high temperature glass and ceramic research and has a wide variety of products using high temperature materials. We are constantly looking for better materials. To be required to pass title to a glass composition that might have evolved out of a small contract to supply a few high temperature windows is not fair or equitable. To be placed in a position where our whole organization has to keep records to protect itself against losing an invention made during the time of a NASA contract, by people not even associated with the contract is onerous.

The Government should have complete freedom to obtain from any source anything resulting from a research and development project paid for with Government funds; and assurance that it will not be required to pay anything further to the company which carried on that project. It may be entirely proper for the Government to exercise control over space vehicles and their use. But it seems unreasonable for the Government to ask for absolute title to every development evolving from NASA contracts, which in our case might be basic glasses and ceramics having wide industrial utility, particularly when such developments could never have been made had it not been for the years of prior research which we have carried on in these fields at our own expense. We hope your committees can provide an adequate remedy for the situation which presently exists.

Sincerely,

WILLIAM J. BELKNAP,
Director of Government Services.

AMP INC.,
Harrisburg, Pa., January 8, 1960.

The Honorable JAMES M. QUIGLEY,
House of Representatives, Washington, D.C.

DEAR MR. QUIGLEY: Your letter of December 22, 1959, relative to research and development contracts with the National Aeronautics and Space Administration indicates an interest on behalf of AMP Inc. which we greatly appreciate.

In discussing the policy of AMP relative to this type of contract, I think it would be helpful for you to understand that AMP Inc. is primarily a manufacturing company and that a certain amount of AMP products have an end use in defense projects as component parts of other pieces of equipment. AMP is also continuously developing new products, some of which may have defense product applications as a component part.

Because of the fact that AMP is a manufacturing company, the engineering, research, and development work performed by it is almost entirely directed to developing new products and to improving manufacturing processes. The activities of AMP's engineering and research staffs are therefore necessarily limited. Consequently, we do not solicit engineering, research, and development contracts as such from either Defense or civilian customers. In this respect AMP differs from those companies actually in the business of selling engineering, research, and development services.

To my knowledge, AMP has never refused any contract offered by the NASA for any reason. On various occasions AMP has undertaken for the Defense Department research and development work falling within the area of its technical know-how and AMP has done such work with its own capital and at its own risk.

I am in agreement with the conclusion of Mr. Holcombe, our patent counsel, who maintains that the National Aeronautics Space Act erroneously deprives the inventor of the civilian rights to his patents. Without laboring the merits of our position with respect to the legislation in question, I think the obvious conclusion is that retention by the inventor of the civilian rights to his patents can attract more competent and experienced suppliers and bring about a quicker and more successful operation of this country's defense program without any extra cost and without sacrificing anything of value to the Government.

However, be assured that AMP, Inc. does not have any policy against accepting research and development contracts from NASA or other Government departments. It has made such contracts before and would not hesitate to do so again in connection with work it is equipped to handle even though we may not agree with all the terms we are sometimes required to accept in such contracts.

We again express our appreciation for the opportunity to clarify the record with respect to AMP's policy in this matter. Needless to say, your efforts in eliminating the error from the legislation in question would also be greatly appreciated.

Very truly yours,

U. A. WHITAKER, *President.*

BOWMAR INSTRUMENT CORP.,
Fort Wayne, Ind., January 11, 1960.

HON. JAMES M. QUIGLEY,
19th District, Pennsylvania,
House Office Building, Washington, D.C.

DEAR CONGRESSMAN: In reply to your letter of December 22 asking for a crystal-clear position of our company regards the NASA patent issue, we have the following to offer:

A very large part of our company business is in defense and space research and development work. We cannot be put on the record as being opposed to engaging in space efforts "except on our own terms."

We can only repeat what Attorney Whiting's letter apparently said that our patent attorney would advise us to decline research contracts with the Government containing the patent provision question. We would have to consider each contract on its merits before accepting or declining.

It is extremely difficult and costly for small businesses such as ours to obtain prime contracts directly with any branch of the armed services and other Government agencies. It would be foolish to further complicate our effort in obtaining business by going on record as opposing our Nation's space effort. However, it would appear that the subcommittee should take note of the business public's attitude in this issue.

Sincerely yours,

EDWARD A. WHITE.

THE ELECTRIC STORAGE BATTERY CO.,
Philadelphia, Pa., January 12, 1960.

Hon. JAMES M. QUIGLEY,
House of Representatives, Washington, D.C.

DEAR MR. QUIGLEY: We appreciate receiving your letter of December 22, affording us the opportunity to make clear to you, to Chairman Mitchell, and to the other members of the Patent Subcommittee of the House Committee on Science and Astronautics the position of our company in respect to contracts under the NASA Act.

We are proud of our company's participation through the years in the national effort for the defense of our country. In view of this record it would be an affront to the loyalty of our personnel as citizens if you or any other Member of Congress should entertain the impression that our company has or might adopt a policy detrimental to the best interests of our country.

For many years we have performed research and development contracts for various branches of the Armed Forces. In each the procurement agency has recognized our special talents and accomplishments in the battery field. In balancing their needs for products for national defense and securing rights for the Government to improvements produced at taxpayers' expense, on the one hand, with preserving to us the contractor rights to developments achieved with our own funds, contractual arrangements always have been made in accordance with the ASPR regulations. These regulations are designed to protect the respective interests of the Government and the private contractor. Under them the contractor retains title to developments first conceived or reduced to practice in the performance of the contract, at the same time granting to the Government a royalty-free, nonexclusive license. This procedure is fair and equitable. It gives the Government, and secures for national defense, the optimum scientific talent available, at the same time encouraging private industry to advance its state of technology, enabling it to use the improvements for commercial applications.

In September 1959, for the purpose of establishing a second source of supply, we received through McDonnell Aircraft Corp. a research and development tender under the NASA Act. In accordance with section 305 of the act, the tender required that title to all developments first conceived and reduced to practice during performance of the contract would become the exclusive property of the United States. We were then and for some time prior thereto committed to research projects carried on at our own expense, results of which, we believe, would contribute directly to the missile and satellite programs. We have been engaged in research efforts of this kind since before World War II and propose to continue in such research programs, irrespective of any contracts offered to us under the NASA Act.

Since we had spent considerable funds of our own in the field covered by the tender, we did not believe it was fair to expect us to relinquish rights to improvements then achieved or on the threshold of achievement. In the negotiations which followed we proposed retention of ownership to these improvements granting royalty-free and nonexclusive licenses to the Government to make or to have others make for it components embodying the improvements. This approach was within the framework of the pertinent ASPR regulations. Indeed at one stage of the negotiations we were informed that the Space Administrator had relaxed his requirements and was seeking no more than required by ASPR. It subsequently developed that this was incorrect.

Later we were informed by the patent advisory staff of NASA that our position had merit and that in similar instances the Administrator had granted waivers under the authority of paragraph (f) of section 305 of the act after the contract had been entered into. We suggested that the matter of waiver should be considered before the contract was signed, but were told that this was not the practice. We then proposed to sign the contract if we could be reasonably assured that the necessary waiver would be granted thereafter. We were told no such assurance could be given. The matter is still in negotiation. Only several weeks ago our facilities were inspected and approved for the work in question.

We consider the patent provisions contained in the NASA Act as unfair to business and detrimental to the best efforts that can be put forth in the defense effort. We say this because there must be many companies who do not have the financial resources to undertake research projects applicable to the defense effort.

We are indeed mindful that this country is engaged in what well may be a life-and-death race in space. We believe this race must be won. We believe it best can be won by preserving the incentives provided by our time-tested patent system. Surely you and your associates must realize that there must be something wrong in the patent provisions of the NASA Act where they have given rise to your own concern about the obstacles created by them. The patent provisions have given us concern because in the allocation of contracts they are arbitrary and provide for no discussions or negotiation or protection of proprietary rights of the prospective contractor.

Very truly yours,

WILLIAM P. CAIRO, *Secretary.*

MINORITY VIEWS BY CONGRESSMAN JAMES M. QUIGLEY ON RECOMMENDED CHANGES IN SECTION 305 OF THE NATIONAL AERONAUTICS AND SPACE ACT OF 1958

Less than 20 months ago the Congress of the United States enacted this country's first space law.

Literally before the ink was dry on the National Aeronautics and Space Act of 1958 an organized campaign was begun against the patent provisions contained in section 305 of that law. The shock troops in this assault were recruited either from industry or the organized bar and most of them were battle-scarred veterans and seasoned campaigners from the long, unsuccessful campaign against Government ownership of patents in the field of atomic energy.

The obvious strategy of the new attack was to avoid the fatal error of the earlier battle by striking hard and quick before the new Space Agency had an opportunity to consolidate its patent position. After that, from this newly won beachhead in the space age perhaps it would then be possible to launch a successful counterattack against the citadel of the AEC and forever drive Government out of the field of patent ownership.

The opposition of both industry and the patent lawyers to the Government taking title to patents as provided for in both the Space and the Atomic Energy Acts is indeed understandable. The patent lawyers interest in the preservation of the patent system is self-evident. As the patent system goes so goes the patent lawyer. And, although I personally feel that the enthusiasts of the patent system have a tendency to overstate their case, there can be no question that a good case can be made out to demonstrate that this system of Government granted private monopolies has been a keystone in this country's tremendous industrial and economic growth under the free-enterprise system. The patent system has been a good thing both for American industry and for America. Neither industry nor anyone else is to be criticized for not wanting to give up a good thing.

What is more, complete candor requires that it be stated that despite their vested interest in the status quo ante there can be no question that much of the criticism leveled against section 305 of the Space Act by industry and the patent lawyers has a certain validity. The record will show that all of the members of the Mitchell subcommittee were critical of section 305.

However, recognizing section 305's imperfections and proposing the right cure for these shortcomings are two entirely different matters. NASA's recommendation on this point, for example, is at sharp variance with many of the proposed remedies suggested by industry and the bar. However, here it should be noted that despite their differing testimony, the witnesses for industry and the patent bar invariably supported the NASA proposed changes even when they insisted that their own proposals embodied the true solution.

A review of the record will show further that the majority of the subcommittee finally agreed on none of the proposed cures presented to it but came up with a recommendation of their own which embodies NASA's basic proposals with certain amendments and with a detailed statement of congressional intent designed to spell out for the National Aeronautics and Space Administrator what the Congress wants him to keep in mind in deciding to keep a patent title in the Federal Government or to give it away.

In my judgment, the several subcommittee amendments and the declaration of congressional intent contained in the report effect substantial improvements over the original NASA proposal. I believe further that the subcommittee's recommendations could very well prove to be an improvement over the present law. However, I am not convinced that the subcommittee's approach affords any real solution to the problem or, in fact, that it is directed at the real problem.

Rather, I am constrained to believe that in this instance the majority of the subcommittee acted as it did, not so much because they were convinced that they had the answer, but rather because they were persuaded that they had to come up with some answer.

The position of the subcommittee can be appreciated when one considers that the ultimate weapon used against the patent provisions in the space law was the broadside blast that the present law is retarding this country's space effort. This indeed is a salvo designed to make brave men quiver. Which one among us wants to be accused of doing or not doing anything that would retard our space program? Which one of us would not do all that he can and everything that he can to have this country overcome the Soviet lead in the space race?

I do not know if there ever really is a moment for panic. If there is, I submit that this is not such a moment. Instead of running for cover and shooting in all directions as we go, I think that if we stand our ground we will soon realize that as awesome as the sound "the present law is retarding the space effort" may be, it is a salvo which falls wide of the target.

A review of the record in the hearings before the subcommittee will show that a substantial segment of American industry is something less than pleased with the present patent provisions in the NASA law. That record further shows that the patent lawyers in this country are practically unanimous in their dedicated opposition to section 305. However, having heard the testimony and reviewed the record I simply am not convinced that, despite the all-out effort to create the contrary impression, the charge that section 305 is retarding this country's space program is substantiated.

Here it should be clearly understood that I am not saying what are or are not the facts. I am saying that on the basis of the testimony presented to the subcommittee the people who alleged that the present NASA law is in fact retarding America's space program failed to establish their case.

What they did establish is that there are a number of American industries which are not seeking and some few even who are not accepting NASA research and development contracts and that the patent policy Congress wrote into the Space Act less than 2 years ago is a factor considered by these companies in reaching this policy decision.

The record also shows that patent lawyers generally have adopted a policy of counseling industrial clients about the possible jeopardy to their patent titles, present and prospective, involved in doing business with NASA. It seems to me, considering the provisions of section 305 and NASA regulations promulgated thereunder, that any lawyer would be derelict in his duty if he failed to so warn his client.

However, there is also testimony which could be constrained to mean that there are patent lawyers who are doing more: That such lawyers are in fact telling clients not to take NASA research and development contracts as long as the present patent provisions remain unchanged. About such possible advice I would have a number of questions: First, is this legal advice or is it something else? Second, if it is legal advice, how sound is it? Third, if it is something other than legal advice, is it part of a temporary boycott tactic designed to force a change in the existing law which will be persisted in only so long as it has a reasonable chance of achieving that goal?

In essence, my position is that the subcommittee was constituted in the first instance largely in response to an organized clamor from a vested interest group and not in the face of any demonstrated public need. Further, this same group took full advantage of the hearings conducted by the subcommittee to weigh the testimony heavily in favor of their particular point of view. I do not challenge their right to do this nor do I question for one moment the wisdom of the appointment of the subcommittee. Most certainly, I have nothing but the highest praise for the tremendous effort made by that subcommittee's members and the staff under the excellent leadership of Chairman Mitchell. What I am saying is that despite its best effort the approach of the subcommittee was necessarily a narrow approach; its view a limited view of what is fundamentally a very broad gaged national problem.

The subcommittee members were completely conscious of this when they frankly stated on page 27 of the subcommittee report, "In making its report and recommendations to the full committee the subcommittee * * * is not attempting to come to grips with all of the fundamental issues which interlace the basic philosophies of our patent system and its operations." I respectfully submit that only by coming to grips with these fundamental issues can the Congress hope to come up with an intelligent answer to the question of what

should be the patent policy of, not just the Space Agency, but the U.S. Government. In defense of the subcommittee in this particular, it should be noted that its report is completely correct when it states that "Such matters are beyond the mission and scope of authority of the subcommittee."

For this very reason, I suggest that a real solution to the problem with which the subcommittee struggled so valiantly was from the very start beyond its mission and the scope of its authority. Despite this, the subcommittee did an outstanding job and rendered a great public service. I commend its hearings, its report and its recommendations to the members of the committee and to all persons seriously interested in devising a sane, workable, uniform patent policy which would be applicable to all agencies of the U.S. Government. However, I am not prepared at this stage of my knowledge of the problem to join with my colleagues in the majority in saying to the Congress, "Back up. Reverse the course you took 20 months ago and this time follow the signpost painted by the Mitchell subcommittee and you will be on the right road."

Mr. ANFUSO. I have one or two questions——

Mr. BASS. May I make the same request?

The CHAIRMAN. Surely. How many letters are there?

Mr. BASS. One.

The CHAIRMAN. No objection.

SANDERS ASSOCIATES, INC.,
Nashua, N.H., March 14, 1960.

Hon. PERKINS BASS,
House of Representatives,
Washington, D.C.

DEAR CONGRESSMAN BASS: I am awfully sorry to have missed you on March 10 when I was in Washington. As you know I was unfortunately called back for personal reasons.

I want to thank you for your telephone call of March 14. As I mentioned to you over the phone, I believe that the subcommittee has done an excellent job of honestly and intelligently reviewing the problem of patent rights in Government procurement.

In light of the comments of NASA's General Counsel, John A. Johnson, and the Assistant General Counsel for Patent Matters, Mr. Gerald O'Brien, I am quite concerned by the breadth of the discretion in the Administrator as to the taking of title of inventions under research and development contracts. The proposed revision of section 305 presents, in my judgment, a mandate to the effect that the Government should only retain a license to practice for Government purposes. It seems to me that the burden of proof under this section is placed on the Administrator to show the existence of need for a greater right. As you know the position of the American Patent Law Association and my own personal position is that the Department of Defense policy as enumerated in the Armed Services Procurement Regulation 9.107 should be codified.

Insofar as the proposed bill presents a mandate, as indicated above, for a limitation to the Government of a nonexclusive license, I believe this section is a marked improvement over the Brooks bill and should be supported.

The statement of intent presented by the committee appears to me to be peculiarly onerous with regard to those circumstances favoring the Government acquiring title.

On page 35, paragraph (B) of the report, it is stated that inventions which depended in substantial degree upon prior or parallel conceptions and work of other parties in such a criterion. I dare say if this statement were construed literally, the Government would take title to all inventions.

Paragraph (C) relating to the Government as the prime developer of a field of technology bears on a substantial percentage of industrial activity in this area. Here again a narrow construction could lead to the Government's taking title essentially at all times.

Paragraph (D) relates to new fields of technology "without significant commercial history and with little chance of nongovernmental development." There is always a lag between a scientific development and its successful introduction into commercial activity. I believe it is unrealistic to expect predictions of this character to be valid. At best only a small percentage of inventions ever become commercially successful. Few of us have the temerity to predict the importance of an invention over the period of the patent grant. I would prefer that the statement of intent clearly spell out the notion that the burden of the

proof is on the Administrator to show that the Government requires additional rights over a nonexclusive license.

In spite of the foregoing, however, it is my understanding that the present policy mitigates in favor of the bill as reported out by the subcommittee over the present law. In the event that it becomes necessary to vote in favor of the proposed bill as it stands or no change, I respectfully submit that it would be preferable to vote in favor of the present bill. In this respect, I strongly agree with your inclination as expressed in your letter of March 2, 1960.

I again wish to express my keen appreciation for the interest you have taken in this problem. I believe that the role of patent rights in Government procurement is particularly important to the development of scientific industries in our State and, of course, of particular importance to my company.

I am looking forward to receiving a copy of the Omnibus Space bill 9675, a copy of the bill reported out by Senator O'Mahoney, 3156, Congressional Record, vol. 106, No. 45, March 10, 1960, pp. 47–60, and the report of the committee hearings.

Very truly yours,

DAVID A. RICH, *Patent Counsel.*

Mr. ANFUSO. I have one or two questions I would like to have on the record. I would like to take this time to ask my good friend, Mr. Mitchell, these questions:

Is the reasoning back of the Armed Forces procurement regulations the fact that the contractor who has made the invention and is in the best position to make it commercially useful should retain the patent incentive to invest capital and manpower in developing, manufacturing and marketing it further? Is that one of the reasons behind it?

Mr. MITCHELL. I think that is part of the theory behind it, Mr. Anfuso.

Mr. ANFUSO. Once full title is in the hands of the Government it, in effect, becomes without an interested owner, so that no one has an interest in making the invention commercially available, is that also another factor?

Mr. MITCHELL. That is the big issue, and the subcommittee—the majority of the subcommittee found that to be true.

Mr. ANFUSO. Is this also true, that long experience with the Armed Forces Procurement Act has shown that ownership of commercial rights in the contractor under whom the invention was made gives the maximum benefit to the public through inducing the owner to later on risk his money and time in endeavoring to make these inventions attractive and available to the public?

It is this sort of self-interest, energy and enterprise that gets these inventions into commercial use and makes our industry dynamic and progressive, is that also one of your reasons?

Mr. MITCHELL. That was a finding of the majority of the subcommittee. I might add, Mr. Anfuso, that it was our finding——

The CHAIRMAN. Let me suggest this: That the chairman of the subcommittee ought to have a chance to make his full report statement, first, I would think. Then we ought to hear from a member——

Mr. ANFUSO. One more question and I am through.

The CHAIRMAN. Then we can go ahead with the questions. They are important questions.

Mr. ANFUSO. One more question and then I am through.

The CHAIRMAN. All right.

Mr. ANFUSO. Now, I think that my good friend, Judge Chenoweth, and also my good friend Mr. Fulton of Pennsylvania, spoke about space as being a place. That certainly is true, because eventually

we are going to have men traveling in space, we are going to have new worlds to conquer, new worlds to travel through and certainly this is not a specific specialized field, as Mr. Holifield would have us believe.

Now, I know—I was against your proposition, Mr. Mitchell, until somebody told me: Now let me give you an example, he says, we have invented something which will purify the urine, the urine which man in space would have to utilize——

Mr. McDonough. This doesn't necessarily mean it can be done only in space, it has widespread use.

Mr. Anfuso. That is right. Now, we have carried out that same theory to purify polluted waters. This can be a household thing in the future, we are working on it, we are spending our money. But if we don't have the patent, we just can't develop it. And as you said, this certainly has widespread use.

The Chairman. What I think we had better do now is to recognize the chairman of the subcommittee for his report. Following that, I propose to recognize the senior Republican for a report, and then any dissenting reports.

(Whereupon at 3:05 p.m., the committee proceeded in executive session.)

TO AMEND THE NATIONAL AERONAUTICS AND SPACE ACT OF 1958

THURSDAY, MARCH 31, 1960

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND ASTRONAUTICS,
Washington, D.C.

The committee met at 10:15 a. m., Hon. Overton Brooks (chairman of the committee) presiding.

The CHAIRMAN. This morning we have Dr. Lee DuBridge, president, California Institute of Technology, Pasadena, Calif.; and Dr. Rubin F. Mettler, executive vice president, Space Technology Laboratories.

I might say for the benefit of the full committee, that this morning's hearing will wind up these hearings, with the exception of the appearance of the head of NASA, Dr. Glennan. He will return to answer any final questions that we may have. Following that, it is my thought that we should go into the matter of checking the bill and deciding what we want to do in reference to it.

Dr. DuBridge, will you come forward and have a seat, please?

Dr. DUBRIDGE. Thank you.

The CHAIRMAN. You have a prepared statement, do you?

Dr. DUBRIDGE. Yes, sir, Mr. Chairman. I have distributed copies.

Mr. FULTON. May we welcome Dr. DuBridge. We are glad he came all this way to be before us.

Dr. DUBRIDGE. Thank you very much.

The CHAIRMAN. We purposely placed you toward the end of the hearings because we thought you would be the type of witness that could appraise the whole situation and give us sort of a final statement.

Dr. DUBRIDGE. Thank you very much.

STATEMENT OF LEE A. DuBRIDGE, PRESIDENT, CALIFORNIA INSTITUTE OF TECHNOLOGY

Dr. DUBRIDGE. I am afraid you are expecting quite a bit because I am not an expert on Government organization, and I only want to give a few views on the general nature of the space program and let you draw your own conclusions as to what this means in regard to the nature of the organization that needs to be established.

I might suggest that my connection with this matter arises from the fact that the California Institute of Technology is a contractor with NASA, formerly with the Army, for space programs, and we operate the Jet Propulsion Laboratory, which is one of the major laboratory arms of the National Aeronautics and Space Administration.

In general, I favor the proposals in the bill which is before you and which has been presented by the administration, because these changes have been offered after nearly 2 years of experience under the present act. I think it is only proper that the President of the United States and the Administrator should be supported in the recommendations which they have made as a result of this experience. One should not expect, however, that important national problems are going to be solved solely by changing or by creating an organization.

A good organization can, of course, conduct its business much more expeditiously than a clumsy one. But even the best organization can be successful only to the extent that it is led by good people, that it can attract able workers devoted to its objectives and it commands active support of the Congress and of the people of the United States.

I believe the proposed amendments to the NASA Act will help NASA do a better job, but I don't believe they will lead to any miracles or will suddenly put us ahead of the Russians in the space field. I do not think of NASA as primarily an organization which has as its sole objective in the near future to launch a vehicle which will have more weight than any the Russians have launched. I think of NASA planned as an organization, planned for the indefinite future, 100 or 200 years, which will be conducting America's space exploration program. And even if there was no such thing as the Soviet Union, our space program would still be of vast importance and should be pursued energetically and effectively.

There are those who have urged that all American space activities be concentrated in the hands of a single organization. Some say it should be a military organization, some advocate a civilian organization.

I do not believe a single all-inclusive space organization is either necessary or feasible or desirable. As has been said: "Space is not a project; it is a place"—and a big place too. My reasons for preferring the present type of joint responsibility divided between civilian and military authorities depend on the very nature of the space program itself. With your permission I should like to present briefly my views on this matter.

Clearly, space exploration is not solely a military program; much of it relates only to scientific research. But, equally clearly, we cannot say that space has no interest to military defense. It has some clearly foreseeable military uses—and it may have others we cannot yet foresee. It would be as unrealistic to expect a civilian organization to give adequate and expert attention to military space programs as to expect a military organization to devote large sums of money and inspired attention to pure scientific research. So it seems that the total task should be shared.

There are those who say that the Atomic Energy Commission is a good example of a civilian agency doing a military job. But remember, even the AEC does only half the military job. It furnishes the warheads. The military services always have had full responsibility for the weapon carrier and for evolving and operating the complete military weapon system. Close collaboration between military and civilian groups was always necessary. And, though there have been many difficulities, such collaboration has been achieved.

A similar collaboration is reasonable in the space field.

To cite one example: An Atlas rocket may be used as a vehicle to carry a powerful thermonuclear warhead to a distant target. It may also be used as a booster stage to send a cosmic-ray counter and other instruments into interplanetary space. It would clearly be wrong to take the first task away from the Department of Defense; and it would seem equally illogical to expect DOD to get very excited about the second task. The solution has already been evolved: By mutual agreement NASA will procure Atlas rockets from Air Force contractors and use them, after adding suitable upper stages, to launch instrument-bearing spacecraft. The Air Force will not be diverted from its military tasks.

It seems to me it is unfortunate there exists so much confusion between the military and the nonmilitary problems in space. We wouldn't dream of proposing, since a farm tractor and a military tank may each use a diesel engine, that therefore the Department of Agriculture should be placed under the Department of Defense, or vice versa.

Clearly, the military services have one task which no civilian agency could handle—the development and use of appropriate equipment, be it rocket or airplane or whatever else, for transporting suitable military warheads from a friendly base to an enemy target—and from all the evidence I have seen it appears the military services have that problem pretty well in hand. Our intercontinental ballistic missiles are both large enough and accurate enough to reach any probable target on earth. What more could we ask? We might like to have a few more ICBM's and have them a little sooner. But we can hardly be said to be behind the Russians in military technology, because the technology of the ICBM's is in good shape.

Now, in the space field the situation is different. To launch a large load into an Earth satellite orbit, for example, or to the Moon or to Mars, takes a much larger rocket than to lift a nuclear warhead to someplace in Russia, let's say, but it does not follow that a larger rocket would transport a nuclear warhead to Russia any better or any faster than the existing ones.

As long as the Atomic Energy Commission can so successfully pack such a large explosive power into such a small warhead, as existing ones, we don't want our ICBM's to be any bigger and thus more expensive to build and more difficult to launch. In fact, our more refined and improved missiles should in the future be smaller—in size and in thrust—than the present one. A chief aim of the military missile program in fact must be to create smaller and lighter and simpler missiles to carry our most powerful warheads to potential targets. But small, lightweight rockets are not the goal of the space program. Very large rockets, half-million-pound thrust, a million pounds, maybe 5 million pounds, will be needed to launch large spacecraft into deep space orbits. NASA has already started developing such rockets, but their purpose and use is for launching spacecraft, not for carrying nuclear warheads.

Now, it is evident that the largest Russian rockets have a higher thrust than ours; hence they have launched heavier objects into space than we can. But this, in itself, has not been any proof of military supremacy; it just means that their thermonuclear warheads must be bulkier than ours.

We would have been foolish to develop 300,000-pound-thrust rockets, let's say, if 150,000 pounds was adequate for our purpose, as far as military missiles were concerned. It is a piece of grim irony that the lack of Russian success in getting a lightweight thermonuclear warhead led to such great dividends in enabling them to achieve such brilliant nonmilitary exploits in the space field. And in the process they deluded many American people into thinking that military supremacy had suddenly passed to Moscow.

But now, what about supremacy in the space field? As you know, the American space experiments have now outclassed the Russian experiments in all aspects except the weight of the vehicle placed in orbit. We have launched more vehicles; those vehicles have carried more and better instruments; they have operated longer and to greater distances, and have yielded more scientific information. Even when larger rockets become available, there is a vast amount of scientific exploration which can still best be done with smaller units, launching 50-, 100-, or 200-pound payloads into various space orbits. Pioneer V, with its relatively small payload—94 pounds—I think is one of the most significant, most valuable, and most successful of all space experiments to date. In other words, size of the spacecraft or its weight is not an end in itself. The weight of the spacecraft should be no greater than the minimum necessary to achieve the intended mission. It is what is inside that counts.

Nevertheless, as the space age advances, there will be more and more missions which will require large and heavy space vehicles. For example, if we wish to achieve a soft landing of instruments on the Moon, a considerable amount of fuel must be carried from the Earth in order to operate the retrorockets to break the fall as it approaches the Moon.

This fuel and the retrorockets may require a doubling or even a trebling of the load which you would otherwise need in leaving the Earth. Of course, if we ever send a man to the Moon with all the supplies and equipment that he needs to get there, and then to return safely, the initial rocket thrust required will be colossal, indeed.

Now, these very large rockets may be performing functions which have no foreseeable military value at all. On the other hand, some future military missions may well require large spacecraft, too. So our most reasonable policy would seem to be to pursue both military and nonmilitary investigations, each by an organization adapted to its task, and each free to pursue its task with maximum freedom from bureaucratic controls.

Finally, I would like to say a word about time scales. It would be nice, of course, if we could land a man on the Moon next month, and on Mars next year, but we are not going to, and no amount of tinkering with organizations or budgets will change that fact.

The space age is young and technologically it is a vastly complex business. Exceptionally competent engineers are required to design and build large space vehicles, and exceptionally competent engineers are scarce. Competent scientists are needed to evolve useful scientific experiments in space and able scientists are also not only scarce but most of them are quite happily at work on other scientific projects of great value. Space problems cannot command all our

scientific and engineering talent, or even a very large fraction of it. Russia, of course, may be able to force all its talent into a single channel in order to achieve a military goal or to enhance national propaganda. Fortunately we are not that kind of a country. In the long run we will be better off by recognizing this and proceeding in accordance with American traditions and American methods.

Of course, I would like to know the chemical composition of the Moon's surface as soon as possible, but I think my curiosity can be made to wait until that job can be done sanely, safely, and economically. We should proceed expeditiously but without hysteria, and we should be certain that every space venture we undertake has a soundly considered scientific function and is not just a stunt, and that it is meticulously engineered, so that failures can be reduced.

With these objectives in mind it should be possible to give NASA the kind of organization and the kind of budget it needs to do a good job.

Thank you very much.

The CHAIRMAN. Thank you very much, Dr. DuBridge, for a very excellent statement.

Now, this morning I have asked Mr. Dick Hines, who is on the committee staff, to check me on the time. Will you check me as well as the other members, please?

Mr. HINES. Yes, sir.

The CHAIRMAN. And give the proper indication when the time of *each member of the committee has expired.*

Mr. FULTON. Mr. Chairman, I would move that this morning we *dispense with the 5-minute rule. I would rather that you have all the* time you would like.

Mr. MOELLER. I would support that.

The CHAIRMAN. Well, I don't need the time, myself, but why not——

Mr. FULTON. There are not many here, and I would rather have you go ahead.

The CHAIRMAN. Why not have a go-around with everybody taking 5 minutes. Then the second time around we shall dispense with the rule.

Mr. FULTON. That is satisfactory.

The CHAIRMAN. All right.

Will you call my time, Mr. Hines?

Mr. HINES. Yes, sir.

The CHAIRMAN. Now, Doctor, you are in a very enviable position out there in California.

Dr. DUBRIDGE. We have very nice weather, you mean? [Laughter.]

The CHAIRMAN. You have acquired great competence there. I say it advisedly. We all agree, I am sure, on the idea that you wouldn't send a boy out to do a man's job. Likewise, you wouldn't send a 3,000-pound-thrust missile up to do the job that a 30-pound-thrust missile could do? For instance, the Sidewinder may require a certain thrust, but it doesn't require the same thrust than an interplanetary missile would require.

Now, I have heard capable men from the Air Force say that in their judgment every development in space this side of the Moon has military significance. Do you agree with that?

Dr. DuBridge. Well, I am not sure I know what they mean by every development. If they mean every technological development of better guidance, more efficient rocket motors, of more efficient staging of first, second, and third stages of rockets, of more accurate orbiting, then of course every technical development of that sort is of potential interest to the military services to enable them to do any space jobs they may have more adequately and more efficiently.

But I think when a cosmic ray counter is sent into space to measure the Van Allen radiation, I don't quite see that this particular experiment has immediate military value.

The Chairman. You don't see that it would have any military value?

Dr. DuBridge. I don't see any foreseeable, clear-cut military value to measuring cosmic rays.

The Chairman. I will ask you this, then: Do you feel that the program is moving along fairly well?

Dr. DuBridge. I think we would all like to see it move more expeditiously. We got a late start in some of these things, but I do not think that by simply changing organizations or adding billions of dollars to the budget that one can accelerate technical developments very much. I think you could get things a little earlier and a little faster by spending more money and employing more people, but the real limit is the number of competent engineers and scientists that are available.

The Chairman. Does your work include work on missiles as well as the deep probe vehicles?

Dr. DuBridge. Our Jet Propulsion Laboratory is just in the process of transition from working for the Army on military missiles needed by the Army to the space task of making spacecraft for NASA. We have not quite completed some of the Army engineering work on the so-called Sergeant Army missile. We are still engaged in that.

The Chairman. In the future will you continue with your work on the smaller missiles?

Dr. DuBridge. No, sir.

The Chairman. You will not?

Dr. DuBridge. In the future our work will be entirely devoted to work under NASA toward spacecraft intended for deep space exploration. That will be the sole task of the Jet Propulsion Laboratory, under present plans.

The Chairman. Then it will have the peacetime tinge to it?

Dr. DuBridge. Solely, yes.

The Chairman. Do you have any better ideas than have already been given us about when we will land on the Moon?

Dr. DuBridge. I am afraid I can't give you a schedule on that. I am sure instruments can be sent to the Moon within the next year or two. There doesn't seem to be any great block to sending instruments to the Moon within the moderately near future, the small package.

The Chairman. With a soft landing?

Dr. DuBridge. Moderately soft. Not really soft, not soft enough for a man, but soft enough for a rugged instrument.

The Chairman. I have no further questions.

Mr. Fulton?

Mr. FULTON. We are trying to revise the organization of NASA so that it will become more efficient. When you had appeared before the Select Committee on Space, which was a temporary committee to look over the problem and set up some form of organization for the executive branch, the Chairman and I were members of it, I recall that you had said that you felt that the NASA organization should be set up in the same way the National Advisory Committee for Aeronautics was set up in about 1915.

Now, that would mean that you would have a board of directors of maybe 15 to 20 persons of high scientific and administrative standing in the country.

Secondly, it would mean they would meet maybe 12 to 15 times a year and be concerned with policy questions.

Third, it would mean that the director of NASA, would be under the policy supervision of the board of directors.

The Space Act passed in the 85th Congress established a space council with the President as chairman. Now, there is the recommendation that that council be abolished.

At this time it is my feeling that maybe we ought to have within NASA some sort of a high level advisory board on the order that existed in NACA. Still, I would believe that once the organization has been established, as it has been, maybe it is better not to tear up the whole NASA and establish a NACA-type organization, but maybe a modified form could be set up without being too disruptive.

Would you agree with that?

Dr. DUBRIDGE. I agree that going back now and trying to set up another NACA-type organization is not feasible. NASA is going, it is underway, and the best way is to strengthen it. I think the present space council arrangement is no longer necessary nor feasible, and that an advisory group to the Administrator of NASA, might be a very desirable thing. It does not seem to me that this needs to be specified in any legislation, however.

Mr. FULTON. May I comment there?

Under the public law as it now stands, the Administrator of NASA has the power to set up boards and committees to advise him.

Dr. DUBRIDGE. Yes.

Mr. FULTON. Advisory committees. But don't you think it would be worthwhile if Congress would outline the method of doing that, and instruct him to do it; because he hasn't done it yet. He has in some instances, but we have come up against this: We are not able to see the recommendations of such an advisory committee set up by the Administrator. Do you think we ought to set the method?

Dr. DUBRIDGE. No, I would be inclined to say Congress should not specify the method of appointment or establishment of such an advisory council or committee or board, but should let NASA itself evolve an advisory organization. Congress should not put it into the act, because as soon as you specify the setup of an advisory council you have to say that there will be a certain number of engineers and a certain number of scientists and a certain number of people from the west and from the south, and a certain number from the north. You have to get representation into it, and possibly have political representatives as well as scientific, and so on. You get a board which might be sort of unmanageable.

If the director is allowed to appoint a scientific advisory committee to advise him on scientific matters, maybe another board of engineers to advise him on purely technical and engineering matters, then it seems to me he has the talent of the country at his command, he can call these groups together as he needs them and as their services are required and on specific questions on which he needs them, and he can give them plenty of latitude to advise on broad matters of general policy.

Mr. FULTON. I am afraid my time is up.

Dr. DUBRIDGE. I have answered your question?

Mr. FULTON. You have answered it, and I agree with you thoroughly.

The CHAIRMAN. Mr. Moeller?

Mr. MOELLER. Mr. Chairman, I want to mention that Dr. DuBridge was a very gracious host to some of the members of our committee last fall at Cal Tech. We thoroughly appreciated your efforts and those of Dr. Pickering.

As a scientist of repute I think you can give us some ideas on the direction we ought to be taking now. You made certain statements here with respect to the scarcity of highly qualified scientists. We have a lot of young boys in the room here this morning. I am glad they are hearing this, because they might be answering the question some day, in helping to provide this type of scientist.

Now, as we look to tomorrow, it is your opinion that we ought to be giving time and attention to different types of fuels if we are to get larger payloads into space, rather than spending time with hardware and engines, or are the two going to have to be carried on simultaneously?

Dr. DUBRIDGE. I think they must go together. A radically different sort of fuel, if it were developed, would probably require a radically different sort of engine and all the controls and so on would be different. So that I think every organization, industry, laboratory, working on improved rockets is working on fuels, or controls, on guidance, on all of these things together to get an integrated rocket launching device.

Mr. MOELLER. Both carried on at the same time?

Dr. DUBRIDGE. There is a vast amount of work going on on the question of fuels, getting more efficient, more reliable fuel systems, going all the way from chemical fuels on up to nuclear fuels, and so on.

Mr. MOELLER. I know you are doing some of that.

Dr. DUBRIDGE. I think these things are underway and many of them could be strengthened and expedited, but my general feeling is this is mostly a matter of getting good people. We are just organizing a space science division within our Jet Propulsion Laboratory to plan scientific experiments that should be done in space, whether it is astronomy, cosmic rays, or exploration of other sorts. We are having a hard time finding first-class scientists to join that group.

Mr. MOELLER. May I ask another question with respect to Pioneer V? Are you aware of any information that the Soviet Union may have gotten from any of its past shots providing it with the same type of information that we are now getting from Pioneer V? Or are we ahead of them in certain types of information that we are now gathering?

Dr. DuBRIDGE. No country has launched an object so far out into space as Pioneer V and kept in contact with it. We are still in contact with Pioneer V, it is still yielding us information. This is the first time that any object has sent back information from as far away as a million or more miles into space, and Pioneer V is still going strong at over 2 million miles; and there is every expectation that it will still be yielding information out to maybe 50 million miles.

Mr. MOELLER. So it is safe to say that we are gathering information now that the Russians at this point do not have?

Dr. DuBRIDGE. That is right.

Mr. MOELLER. If I may be facetious for a moment, the last sentence on page 3 of your statement is intriguing. It looks as though a man as busy as you still has time to look at some cigarette advertisements. "It is what is inside that counts." Maybe you could have said "It is what's up front that counts." [Laughter.]

Dr. DuBRIDGE. No comment.

The CHAIRMAN. Mr. Van Pelt?

Mr. VAN PELT. No questions.

The CHAIRMAN. Mr. Roush?

Mr. ROUSH. In the third paragraph on page 3 of your statement, you say:

> It is a piece of grim irony that the lack of Russian success in getting a lightweight thermonuclear warhead led to such great dividends in enabling them to achieve such nonmilitary brilliant exploits in the space field.

What are the brilliant nonmilitary exploits you refer to?

Dr. DuBRIDGE. Simply the launching of large spacecraft into satellite and solar satellite orbits. They have been able to launch these satellites because their rocket boosters are very large, and I am assuming that their rocket boosters are large because their thermonuclear warheads were heavy, therefore they had to have rocket boosters to boost them to that distance.

Mr. ROUSH. I was under the impression that anything the Russians have done to date we could have done and are capable of doing, including the orbit of these various planets, and as a matter of fact we are doing it with the same thrust that we have today, our lower thrust. We did not require 600,000 pounds of thrust or 650,000 pounds of thrust to do those same things.

Dr. DuBRIDGE. Well, we have launched objects into a variety of orbits around the Earth and into orbits around the Sun and interplanetary space, but we are not able with our present rocketry to send as large packages, as heavy packages into these orbits as the Russians have done, simply because the rockets now available, now in use, have a smaller thrust than the rockets which the Russians apparently have in use. So that they apparently do have in production and in regular use rockets of substantially larger thrust than our Atlas, for example, which is the largest one we are now using.

Mr. ROUSH. There has been no doubt in my mind that they are ahead of us in this matter of thrust, but I do become disturbed when I hear us use that as an excuse for their firsts. I don't believe that that is the excuse. I don't believe it is.

Dr. DuBRIDGE. It is not the sole excuse——

Mr. ROUSH. Because we can do many of these things just as well with what we have.

Dr. DuBridge. We can send objects into earth satellites, orbits near the Moon and near Mars, it is just that our packages will be smaller. We are also very good at making lightweight instruments, so I think we could put a lot of instruments into a small package.

Mr. Roush. No further questions.

The Chairman. Mr. Bass?

Mr. Bass. I would like to ask you a few more questions about Pioneer V, which intrigues me.

Dr. DuBridge. The next witness is the real expert on Pioneer V, because it was his organization that supervised the manufacture and launching of it. I would suggest he knows very much more about Pioneer V than I do. If I can't answer your question I will refer it to him anyway.

Mr. Bass. My questions are not difficult. How fast did Pioneer V travel—how fast is it traveling now?

Dr. DuBridge. With respect to the Earth, it is traveling something like 4,000 or 5,000 miles an hour. But remember that the Earth is traveling around the Sun all the time with a speed of something like 70,000 miles per hour, and of course Pioneer V has this speed added on to its speed with respect to the Earth. So its total speed—not in the same direction—its total speed around the Sun is something of the order of 75,000 miles an hour.

Mr. Bass. Will it maintain that speed now all the time?

Dr. DuBridge. Forever. It is in an orbit going around the Sun, though the speed will go up and down, it will be slower as it gets further away from the Sun, the average speed now will always be something of the order of 70,000 miles per hour or a little more, about the same, a little faster average speed than the Earth has in going around the Sun, because it will go around the Sun in slightly less than a year, and it takes the Earth a year.

Mr. Bass. Then it will take an awfully long time until it gets as far distant from the Earth as 50 million miles?

Dr. DuBridge. Fifty million miles is the extent to which the radiation will be detected with the instruments. It will take some time to get that far away from the Earth. Because with respect to the Earth, its speed is only 5,000 miles per hour greater.

Mr. Bass. Are we still receiving signals from the 5-watt radio transmitter?

Dr. DuBridge. They haven't switched to the other one yet.

Mr. Bass. At what point will we switch to the 150-watt transmitter?

Dr. DuBridge. May I refer that to Dr. Mettler?

Mr. Bass. I gather that will be done simply by pushing a button?

Dr. DuBridge. Yes.

Mr. Bass. And that 150-watt transmitter—if my arithmetic is correct—is 30 times as powerful as the 5-watt?

Dr. DuBridge. Yes.

Mr. Bass. So if all goes well we will be in contact with the Pioneer V at all times?

Dr. DuBridge. Well, no. You see, the Earth is going around the Sun, and Pioneer V is going around the Sun, and they are going at not quite the same speed. Like two horses on a track, one will gradually get farther away from the other. Pioneer V is beating

the Earth, going a little faster around the Sun than the Earth is. In the course of years Pioneer V will gain a whole lap on the Earth. So eventually it could be as far away as something like 150 million miles. I think that would be its maximum distance when it is on one side of its orbit and the Earth is on the other side of the Sun. It is 90 million miles from the Earth to the Sun, and at its minimum Pioneer V could be 70 million miles to the other side of the Sun, so 160 million miles might be the maximum.

Mr. BASS. I gather you don't believe it would be possible to receive signals from the large transmitter at that distance?

Dr. DUBRIDGE. From the 150-watt transmitter, 50 million miles would seem to be the maximum, with existing instrumentation. It is possible if we had a very much larger receiving antenna, or a very much more sensitive one of some sort, that we might be able to detect it somewhat farther out. But at a certain distance what happens is the signal from this object will be so weak that it will be lost in all the other radio noise that always exists on the Earth. And we simply won't be able to hear it.

Mr. BASS. How many tracking stations are picking up the signal now?

Dr. DUBRIDGE. Two are at work now, one in England and one in Hawaii.

Mr. BASS. Would it be possible for a ham operator to pick it up?

Dr. DUBRIDGE. No. The one in England uses a collecting dish which is 250 feet in diameter.

The CHAIRMAN. The gentleman's time has expired.

Mr. McDonough? He came in a little late, he wasn't overlooked.

Mr. MCDONOUGH. Very glad to see you here this morning. We are always happy to have your advice and counsel. You have been with this committee from the beginning, even the select committee. We appreciate the fine work you are doing at the Jet Propulsion Laboratory of Cal Tech.

Dr. DUBRIDGE. Thank you.

Mr. MCDONOUGH. In the bill before us the question of duplication and the question of who has the deciding word on some of these vital questions is a matter the committee is trying to settle. Yesterday Dr. Pickering was before the committee and indicated that possibly a solution would be to have the deputies of the two Departments, Defense and Space, set up as a coordinating committee to review the important and pertinent questions, and then more or less conclude, if there is no further controversy over it.

Now I think we have to recognize, and I notice you do in your statement, that powerful thrust rockets can be used immediately for defense purposes and also for exploration in outer space. Do you think that such an organization as the chief deputies of the two administrators, Defense and Space, coming together, would be a means to settle some of these questions?

Dr. DUBRIDGE. I wouldn't be competent to judge as to which particular officers in the Department of Defense should consult with which officers in NASA. But I do think that officers in the two organizations should remain in continuous contact so that they can coordinate their activities, can plan together on future ventures that might be of interest to both sides, can see that there is no unnecessary

duplication in the technological development of instruments which both might need. And it would seem to me that this contact ought to be a fairly wide contact, not just one officer in each organization getting information, but there will be one man in NASA who will have responsibility for scientific activities, another one will have the responsibility for large booster rockets, another one will have the responsibility for Earth satellite experiments, and another one will have responsibility for Mars or Venus or interplanetary space experiments, and so on, and in Defense, too, there will be a whole series of people with differing responsibilities, and there ought to be a multiplicity of contact between the two organizations, and, indeed, I think there is.

Mr. McDONOUGH. In other words, we should use the facility for its greatest use with the least amount of duplication that is possible.

Dr. DUBRIDGE. Yes.

Mr. McDONOUGH. That is, to get the ultimate efficiency out of it at the lowest cost. I appreciate that. I have no further questions, Mr. Chairman.

The CHAIRMAN. Now, it is 5 minutes to 11. I would suggest that in order to be fair with both witnesses, we proceed with Dr. DuBridge until 11:10. That will give us 15 minutes more. Mr. Fulton tells me he has more questions. Then we will proceed to hear our other witness, Dr. Mettler. If there is no objection, that is the way we will proceed.

Mr. Fulton?

Mr. FULTON. I like your statement at the bottom of page 1:

> I do not believe a single all-inclusive space organization is either necessary or feasible or desirable.

I believe that space is a place, just as you do, and that there can be every kind of activity, just as there can be on the Earth, the sea, or the atmosphere. We had a witness before us yesterday, whom you know, Roy Johnson, formerly Director of the Department of Defense Advanced Research Projects Agency. Mr. Johnson took issue with Congress that space should be developed for peaceful purposes during his appearance before the House Science and Astronautics Committee yesterday. He said specifically:

> There is a widespread almost emotional movement to declare space, like Antarctica, a peaceful place, and this is as hopeless of being effective as declaring ground, air, or water exclusively peaceful.

And he called this so-called drive for peaceful purposes a fairly sinister development.

Now, I think that space can be used for as many things just as the area within the Earth's atmosphere can be used, and that it should be used for every kind of a purpose, and one of them is for health. For example, on heart attacks, if you have a place that is an orbiting satellite where you want to take the strain off hearts, then you would have a place where the body is weightless, blood is weightless, and the heart's only work is against friction, not against weight, and that would be especially good for fat people. [Laughter.]

Because the weight wouldn't be pressing on their blood vessels. Another example, in the treatment of cancer, we know we can aim a beam of radiation at a localized cancer. But on leukemia or lymphatic cancer, or stomach cancer, nobody has ever tried a gradual

exposure of the body to the magnetic fields that are above the Earth's surface, or the Sun's rays, without any interference of the Earth's atmosphere. Maybe in cancer research we might find the people who are prone to it and by exposure of a certain technical kind, maybe inhibit the development of early cancers by a general exposure to the Van Allen magnetic fields. Now, that type thing interests me very much. Don't you think there is a field in the future for that?

Dr. DUBRIDGE. I think your suggestion in regard to treating heart attacks by weightlessness is very interesting and technically a feasible one. The place might get kind of crowded up there if everybody who has heart trouble is orbiting around the Earth instead of sitting on it, and it might be a little expensive. [Laughter.]

Nevertheless, as an experiment to perform, I think it is a very useful one.

Mr. FULTON. Do you think there is a field for medicine, for general basic research and development, and for many types of research for peaceful purposes in space?

Dr. DUBRIDGE. As far as radiation is concerned, whether it is used for cancer or anything else, we certainly ought to know what kind of radiation is coming from the Sun that doesn't get through the atmosphere, what kind of radiation coming from other places that doesn't get through the atmosphere. We ought to examine that radiation, because it will tell us many things beyond the purely medical applications, many things about the distant objects in space, about the nature of the Sun's magnetic field.

The CHAIRMAN. Will you speak a little louder?

Mr. FULTON. We have a rule on this committee that any member can yield for a question. So, using the full extent of that rule, I now yield for a question to my young friend, a member pro tem, on my left, Mr. Scott Anderson, a gentleman from McLean, Va., who is spending a year——

The CHAIRMAN. Now wait——

Mr. FULTON. Just a minute until I get through.

The CHAIRMAN. The gentleman is out of order if he is going to yield to a nonmember of the committee. He can't do that.

Mr. FULTON. Let me finish my sentence, please.

The CHAIRMAN. Go ahead, but the gentleman is out of order.

Mr. FULTON. Let me finish my sentence, please.

Do I have that authority?

The CHAIRMAN. Oh, yes, go ahead, and finish your sentence, and then the Chair will rule that the gentleman is out of order.

Mr. FULTON. Yes, but do not rule before I finish my sentence, because you may find——

The CHAIRMAN. The gentleman is going to find his time has expired before he has finished the sentence.

The gentleman's time has expired.

Mr. FULTON. I have the right, I believe, to finish my sentence and question.

The CHAIRMAN. The Chair——

Mr. FULTON. I have the right to finish the question.

The CHAIRMAN. If the gentleman wants to finish his sentence, go ahead and finish it. His time has expired.

Mr. FULTON. Well, I don't know. I thought that these students here might like to have an opportunity to ask a question to such an

eminent scientist. If the Chair is so rigid on his ruling, I think that possibly the students will have to forgo this.

The CHAIRMAN. If the gentleman wants to appeal from the Chair, it is all right with the Chair, but I think that our rule covers yielding only to members of the committee.

Mr. FULTON. May I finish my sentence?

The CHAIRMAN. There is somebody else who wants to ask some questions. Go ahead and finish——

Mr. BASS. Mr. Chairman.

The CHAIRMAN. Yes.

Mr. BASS. If we have a minute or two more, I would like to pursue my line of inquiry.

Mr. FULTON. Would you yield to me?

The CHAIRMAN. The gentleman is recognized, then, for 5 minutes.

Mr. BASS. Doctor, I would like to ask you a few more questions about Pioneer V. What information are we picking up with regard to what is out there, a million or two million miles away?

Dr. DUBRIDGE. May I refer that question to the next witness? Would you just as soon ask him, because he is in close contact with all the telemetering that is going on, and I am not, and I simply can't answer.

Mr. BASS. Would you be able to tell me whether the Pioneer V is coming into contact with any micrometeorites or dust, or anything of that kind, any obstruction?

Dr. DUBRIDGE. I am sure it probably is. I don't have the information upon how many or how intense, and I am not sure the telemetering records have been analyzed yet.

Mr. BASS. Are the instruments all functioning perfectly?

Dr. DUBRIDGE. As far as I know, they are.

Mr. BASS. Thank you, Doctor. I will save my questions.

Dr. DUBRIDGE. I am sorry, this is just not close to my recent information.

The CHAIRMAN. Is the gentleman through?

Doctor, may I ask you a question or two? Now, there is a 5-watt sending apparatus in Pioneer V. Isn't it amazing that it is sending messages back from 2 million miles with only 5 watts?

Dr. DUBRIDGE. That is a great tribute to the sensitivity of the receivers.

The CHAIRMAN. How much power is 5 watts if you measure it by electric light globes that we use?

Dr. DUBRIDGE. An ordinary electric light is 50 to 100 watts.

The CHAIRMAN. So it is about 10 times a——

Dr. DUBRIDGE. Ten times less.

Mr. MCDONOUGH. One-twentieth of a hundred-watt globe.

The CHAIRMAN. The 100-watt globe would consume 20 times the power that that sending station consumes?

Dr. DUBRIDGE. Yes, sir.

The CHAIRMAN. And it is sending messages back 2 million miles?

Dr. DUBRIDGE. That is right.

The CHAIRMAN. How far out can they go and still use that 5-watt station? I had the privilege the other night at 2 a.m. of listening to that signal coming in.

Dr. DUBRIDGE. Did you?

The CHAIRMAN. I would rather they had gotten the signal in the daytime. [Laughter.]

But it is an amazing feat, there is no question about it. How far out can it go and still be heard?

Mr. MCDONOUGH. Isn't the power on the receiving end rather than on the sending end?

Dr. DUBRIDGE. No, on the sending end, 5 watts in Pioneer V are being transmitted. So it is like a 5-watt broadcasting station. An ordinary powerful broadcasting station is 50,000 watts. Most of the broadcasting stations you tune your radio in to are 50,000 watts. This one is a little smaller.

The CHAIRMAN. Why is it we have to use 50,000 watts down here when up there only 5 watts are required?

Dr. DUBRIDGE. There are several reasons for that. One is that the ordinary radio receiver you use is not very sensitive compared to the ones that are being used to pick this up. Secondly, one reason you use a large amount of power on the Earth is because the Earth is round and you don't get a direct line of transmission. Most of your radio stations would likely be out of sight, and they have to be reflected from the ionosphere or other things, but this Pioneer is in direct line of sight, there is no atmosphere to absorb it or reflect it, and it doesn't have to travel around the curvature of the Earth. But primarily it is because the receivers are extremely large, these enormous antennas, 100 to 200 feet in diameter, extremely sensitive detecting equipment, far too expensive to be used——

The CHAIRMAN. But the signal at 1 million miles was just as clear as a bell, and strong, too.

Dr. DUBRIDGE. Yes, at 5 million miles or so they will switch to the 150-watt transmitter. It just shows that receiving information from far distant objects is going to be quite a feasible undertaking.

The CHAIRMAN. It will be no problem at all after we get these satellites.

Dr. DUBRIDGE. Those who devise these radio receivers may suggest it was a problem to get them so sensitive, and they are very large and very expensive installations.

The CHAIRMAN. I want to yield to my colleague, Mr. Fulton.

Mr. FULTON. Thank you.

This young gentleman is on active duty at school, and on detached duty to Washington, D.C. He has a very fine question to ask Mr. DuBridge, but under the ruling he can't ask it, so I will.

He said this hearing is about the term "space," so he wants to know from me to Dr. DuBridge: Where does space begin?

If the Doctor will answer that, I think he will be a very eminent scientist.

Dr. DUBRIDGE. It is a matter of definition, because you could say this is all space around us. But from the point of view of the present type of discussion we usually think of space as beginning at the place where the Earth's atmosphere has been reduced to negligible density. Now, this is at an altitude above the Earth of something like 100 miles. From 100 miles on out is a normal concept of space, as far as sending vehicles into space is concerned. Even at 100 miles the atmosphere is sufficiently dense so that a satellite traveling only 100 miles above the Earth would not stay in orbit very long, because the air friction would rob it of its energy.

One has to be more than 200 miles above the surface of the Earth to be sufficiently far out of the Earth's atmosphere so that the atmospheric pressure or atmospheric friction becomes negligible. Let's say from 100 miles on out, roughly, we refer to space.

Mr. FULTON. Thank you, that is very enlightening. My followup question: At what point orbiting above the Earth's surface do we get into the problem of sovereign nations and security of the peoples of the world? How near is it that it creates a danger to us to have a military object orbiting?

Dr. DUBRIDGE. That is extremely difficult to answer. Conceivably an enemy could shoot at us from the Moon or even maybe from Mars, I mean someday. So that there is no particular distance at which one can say no danger could result if an enemy had a satellite or a space object there.

Now, this would be extremely difficult, and I don't advocate the Moon as a military base. I don't think it is very feasible at the present time. But to exclude it from all future possibilities as a danger zone would be foolish.

Mr. FULTON. That is all.

The CHAIRMAN. Thank you very much, Dr. DuBridge. Our time has expired under the arrangement we had.

We do appreciate this. We know you have come a long, long distance to testify, and your testimony is very valuable. We would like to have much more time with you, but we can't afford it at this time.

Dr. DUBRIDGE. It has been a privilege to be here. Thank you very much.

The CHAIRMAN. This morning, we also have Dr. Ruben F. Mettler, Space Technology Laboratories, Inc. The doctor has also come a long distance.

Incidentally, I, too, would like to be able to yield for questions to all of these young people who attend our hearings. We are glad to have you with us this morning. But I am faced with a practical proposition. A man like Dr. DuBridge, who has come 3,000 miles across the continent, is entitled to the serious consideration and undivided attention of this committee. And I intend to see to it that such witnesses get the consideration which they deserve from the committee, that is all.

Now, Doctor, you have a statement?

Dr. METTLER. Yes, sir.

The CHAIRMAN. Without further delay, we will be very happy to have you give your prepared statement, if you will.

Dr. METTLER. Thank you, Mr. Chairman.

STATEMENT BY DR. RUBEN F. METTLER, EXECUTIVE VICE PRESIDENT, SPACE TECHNOLOGY LABORATORIES, INC.

Dr. METTLER. I would like, before answering specific questions, to make a few remarks that I think are pertinent to a discussion of the National Aeronautics and Space Act of 1958.

In my opinion, the United States has made truly impressive strides during the past 5 years in the development of ballistic missiles and in the initial exploration of space. The technical complexity of missile and space technology has been matched by the administrative and

management problems associated with legislating, planning, organizing, funding, and contracting for radically new activities of immense scope in a short period of time. Initially, there was no reservoir of commonsense understanding of the scientific or military or prestige value of accomplishing various particular space flight projects. Yet, space technology was obviously a field in which major projects would become increasing large and complex and expensive and would increasingly take on the character of national and even global undertakings. And to further complicate matters, a rapidly multiplying number of alternate projects became technically feasible. With limited economic and intellectual resources, it was—and I believe still is—very important to distinguish between what is possible, on the one hand, and what is needed, on the other hand, between what could be done and what should be done.

It is perhaps not surprising that the problems of coordination, liaison, and duplication have tended, during the past several years, to dominate discussions of the organization and management of space projects. However, I believe it is time for some shift in emphasis. During the next 5 years, these problems and the administrative mechanisms which they require are likely to decrease in relative importance. It is now possible, and I believe necessary, to turn our principal attention to new and forward-looking problems.

I believe it is possible to turn to new problems because there has gradually emerged during the past 2 years what appears to me a clear-cut image of the need for a vigorous program of space exploration in its own right, as a complementary national requirement to the need for a vigorous national defense program. Of course, the national defense program must include the development and use of space vehicle systems as needed to best carry out the military missions of surveillance, defense, offense, and so forth. I believe it is clarity in defining fundamental purposes and objectives and the establishment of clearcut authority to meet these objectives, on the one hand, rather than detailed administrative mechanisms, on the other hand, that will be really fundamental in achieving coordination and liaison, and only the proper amount of duplication.

I believe it is necessary to turn to other problems, because we stand in danger of failure to fully exploit the rather remarkable beginning that has been made during the past 5 years in the United States missile and space development. I would suggest that the emphasis should now shift from the problems of coordination and liaison, to greater encouragement of aggressive leadership and more rapid decisionmaking, based on the definition in depth of long-range objectives and goals, now made possible by the clear definitions of the separate functions of NASA and the Department of Defense.

For these reasons it appears to me that the proposed amendments to the National Aeronautics and Space Act of 1958 are in the right direction. It appears to me that more clearly defining the functions and objectives of NASA as distinct from those of the Department of Defense, more clearly providing the authority to carry out those functions, and eliminating the more detailed statutory description of how the job is to be done—that is eliminating the Council and the Liaison Committee—are all generally desirable amendments.

The National Aeronautics and Space Act should presumably act as a stabilizing flywheel to give direction and purpose to the long-

range objectives of the Nation in space exploration for peaceful purposes. In this regard, I would like to suggest that the legislation might more fully recognize the global impact of space exploration, and might in spirit project itself somewhat farther into the future.

Perhaps a few short examples will clarify my point. There is always danger in the planning and execution of a specific project that we become so wrapped up in our own problems that we underestimate the potential importance of these projects to other nations of the world. At noon today—I made a special check on this—Pioneer V will have swept out and gathered data along approximately 30 million miles of space on its trip around the Sun, and it will be about 2.8 million miles from the Earth. The scientific experiments, solar power supply, and space communications systems are functioning perfectly and data is being periodically received on Earth upon command. Consider the dramatic impact on all nations of the world if Pioneer V or perhaps another satellite like it carried pieces of scientific equipment—however small—supplied by selected nations in Europe, Asia, South America, North America, Africa, and Australia. With a little help, building selected small equipment to be carried in a satellite would be within reach of almost any nation, and the cost would be almost trivial in comparison to the potential good. I note, in reading the proposed amended legislation, that in section 203 it states that the Administration "may" engage in a program of international cooperation. Perhaps the "may" should be replaced with "shall," and the whole paragraph strengthened.

As a second example of the spirit that I would try to convey, let me comment on the specific statutory provisions of section 309(b) aimed at preventing duplication in launch vehicles. Undoubtedly the control of launch vehicle duplication is important today—basically because of the necessary and, I believe, correct use of military ballistic missiles as initial vehicles for space exploration. However, I really believe this situation is a temporary one, related narrowly to today's vehicles and today's projects. I think it is likely that in 10 years the space vehicle configurations used by NASA for space exploration will and should be significantly different from the space vehicle configurations used by the Department of Defense in carrying out military missions. The 10-year look may suggest that launch vehicles are really not so special a problem as to require specific statutory regulation.

As a final comment, I wish to thank you for this opportunity to express some organized opinions on this important legislation.

The CHAIRMAN. We certainly thank you, Doctor, for your statement. Now, I would like to ask you this: What would you think of a provision in our bill which might provide for a military applications division in the NASA organization?

Dr. METTLER. My opinion is that it is probably undesirable to specify a mandatory military applications division in the NASA. I do believe—and I think it is crucially important—that the knowledge gained, the information, the applicable pieces of hardware as they may develop in the space exploration program, be made available for use by the Department of Defense.

The CHAIRMAN. Doctor, we may just as well face the situation. The military is not entirely happy under the present setup. I went

along for years working with the NACA, and the military was thoroughly satisfied with the NACA. But now there is a feeling that some of these projects, and some people say all these projects should be under the military. Some say it should all be under one organization.

Now, in trying to work out an arrangement which would be more acceptable to the military, don't you think a provision requiring a military applications division would be of some assistance.

Dr. METTLER. I really don't. I do not believe that all of these projects should be under the military. I do believe, and strongly, that the Department of Defense requires and must have the authority and the resources to develop whatever it needs to carry out military missions. I might use an example. I think that an important requirement in military programs is communications, but I don't really believe it need, in a fundamental and long-term statutory sense, make any difference at all whether that communications is by a buried cable under the ground or by impulses through the surface of the Earth, which, by the way, is a very promising technique, or by communications satellite. I think their job and their need is to communicate, and space should be used if it is a good way to do so.

The CHAIRMAN. I grant you that the military does need communications, but that doesn't necessarily mean that the military will take over the Bell Telephone Co., for instance, in order to have communications. It just doesn't work that way. But, on the other hand, I think that these witnesses feel that practically every development this side of the Moon is going to have military significance, and if that is the case, or if it approaches that, then wouldn't the military be much better satisfied if they had a military applications division, like the Atomic Energy Commission has?

Dr. METTLER. I can't comment on what would best satisfy them. I am sure they have told you what would best satisfy them. I would answer your question in a manner rather similar to Dr. DuBridge's answer; that is, the scientific, the technological information gained in a probe to the Moon, will, and perhaps even in unexpected ways, contribute importantly to developments for hardware for military use. It appears clear that that is not the same as defining all such projects as being necessarily under the management of the Department of Defense.

The CHAIRMAN. What is wrong with letting them sit in on that arrangement?

Dr. METTLER. I think that is fine. The coordination, liaison, is essential.

The CHAIRMAN. Mr. McDonough? My time has expired.

Mr. MCDONOUGH. In your statement you say on page 4 the scientific experiments, solar power supply, space communications system, are functioning perfectly and data is being periodically received on Earth upon command.

Now, just for our information, will you inform us, if information is desired, in what manner does the Earth operator send the question to Pioneer and in what manner does Pioneer respond?

Dr. METTLER. All right. I will try to explain that. Let me start with the power supply, because it is important. To begin with, the paddles collect solar energy and charge a battery. This battery, then,

powers the transmitters when a command from Earth is sent asking that the transmitters be turned on. Now, there is a complication there. The Earth, of course, is round and it turns and Pioneer is out here in space [indicating], so that it is only what is on top of the Earth, if you want to think of that way——

Mr. McDonough. In direct line.

Dr. Mettler. In direct line, and not what is underneath it that can communicate. There is a central headquarters, we call it a Space Navigation Center, out at our company, in Los Angeles, which keeps track of the rotation of the Earth, the motion of Pioneer and the direction that an antenna on the Earth must point in order to point right at the Pioneer. At intervals of approximately 4 hours, roughly, as the solar cells charge up the battery, and when the right antenna is properly in line, the transmitters are commanded to answer. They then transmit to Earth the data which in the interim time has been measured and stored in the satellite, and it is all sent out at once onto a paper tape and on phone lines to Los Angeles.

Mr. McDonough. Well, that is a good mechanical description of it. Now, for instance, if I want to know what is the temperature at the point that Pioneer V is now orbiting, I ask Pioneer V the question, and how does Pioneer V respond to this question on temperature?

Dr. Mettler. All right. It responds to temperature by transmitting the signals from one temperature measuring device which is in the satellite itself, and one out on the paddles. The answer it would give is that the temperature of the paddles is about 30°——

The Chairman. Twenty-seven degrees.

Dr. Mettler. It has gone up a little bit in the last few days.

The Chairman. It has?

Dr. Mettler. And the temperature of the main body is about 85°.

Mr. McDonough. How does the Earth operator know, is it a series of dots and dashes?

Dr. Mettler. There is what we call a digital communications system. A better term for it would be "a coded language"; if you know the code you can understand what the temperatures are.

Mr. McDonough. And the same with respect to the question of what the pressure is at the point that you are at?

Dr. Mettler. Correct.

Mr. McDonough. And what speed you are traveling at?

Dr. Mettler. Speed is not measured in the satellite. Speed is measured from the ground.

Mr. McDonough. And the length of time from the time you ask the question that it gets to Pioneer, and the time it responds, what is the period?

Dr. Mettler. It varies with the distance. The transmission is at the speed of light, which is about 183,000 miles a second. At the present time it takes about 15 seconds for the transmission to reach Earth.

Mr. McDonough. Presuming that Pioneer V was a much larger unit, we will say a space platform, with men on board, and you had an equally powerful unit on Earth to command, you could by electronic impulse from the Earth's station and to the space station change its position, direct its operation, and do many other things. Hasn't Pioneer V proved this to us?

Mr. Mettler. Yes, it has.

Mr. McDONOUGH. This is not a presumption? I mean this is an actual fact that could be put into operation, providing we had the equipment to do it?

Dr. METTLER. That is correct.

Mr. McDONOUGH. And the fact that we have now obtained communications at more than 2½ million miles from a satellite is a greater step in the direction of scientific knowledge than Russia up to now has produced?

Dr. METTLER. That is my impression, yes.

Mr. McDONOUGH. In your opinion, is the information from Pioneer V more important than Lunik I?

Dr. METTLER. Yes.

The CHAIRMAN. The gentleman's time has expired.

Mr. McDONOUGH. We have broken through.

The CHAIRMAN. Mr. Moeller?

Mr. MOELLER. Dr. Mettler, I would also like to say for the committee that you and your associates were very gracious hosts to members of our committee last fall, when we visited you.

Dr. METTLER. Thank you.

Mr. MOELLER. I appreciate your fine statement this morning also. Incidentally, on page 3, when you talked about your suggestions with respect to the philosophy that we are going to be developing now, you made mention of the fact that we ought to shift from problems of coordination, liaison, and you eliminated duplication which appears in the manuscript. Is there some concern on your part that there might be some duplication that we ought to be concerning ourselves with, since you eliminated it here?

Dr. METTLER. No. If I read it again—I think I missed it in the reading.

Mr. MOELLER. In other words, you think we should shift emphasis, as you talked about, the leadership and decisionmaking?

Dr. METTLER. I means to say that I believe we should shift from what they have been doing. When things are getting started, as they have in the last few years, and when one is bringing into being a new organization such as NASA, then I believe, naturally, these are the first things that one must deal with—making certain that this new organization doesn't simply duplicate what an existing one will do.

Having done that, the liaison and coordination are still important, but I believe they are less important than some new and forward-looking problems.

Mr. MOELLER. Do you feel that the proposed legislation is the implement to help bring about this speedier decisionmaking?

Dr. METTLER. Yes, I do. I read it carefully, and I believe the changes that more clearly define the authority and the purpose will make it, without question, do the job.

Mr. MOELLER. And our objectives and goals are going to become more clear under the present arrangement?

Dr. METTLER. I believe they will, yes.

Mr. MOELLER. One final question. Congressman Bass made reference before to Pioneer V and the information they were getting from it.

Dr. DuBridge said at a given time the button would be pushed and this would be transferred then from the 5-watt to the 150-watt

transmitter. May I ask where is this button to be pushed for this purpose?

Dr. METTLER. There are really two; one in Hawaii and one in Manchester, either of which could be used.

Mr. MOELLER. Is that Jodrell Bank?

Dr. METTLER. Yes.

Mr. MOELLER. Either one, but only one is required?

Dr. METTLER. Yes.

Mr. MOELLER. Which would be the more likely one to be used? Let us say by the end of April.

Dr. METTLER. I might comment on that generally, having had the benefit of listening to Dr. DuBridge's questions. The distances that are being achieved in communications, and the general fashion in which the experiment is performing, make it appear now that the 5-watt transmitter will actually operate out to greater distances than we had originally anticipated.

My current best estimate, which is about a day old, of when it will get to the point where it will be desirable to turn on the 150-watt transmitter is at about 10 million statute miles from the earth, at about the middle of May.

In short, it appears to us now that we can wait a little longer than we previously thought to go to the high-powered transmitter.

Mr. MOELLER. At about mid-May we will be at 10 million miles?

Dr. METTLER. That is correct.

Mr. MOELLER. That is all, Mr. Chairman.

The CHAIRMAN. Mr. Fulton?

Mr. FULTON. I liked your suggestion that we should change the statute not in accordance with the request that the administration made, but so as to provide for a program of international cooperation in space, by changing the word "may" to "shall." I believe that is a good recommendation, and I will be glad to put that in as an amendment, so your appearance has already borne fruit on one aspect of the problem.

You believe that there should not be one space agency, solely military? I believe you would say that there should be adequate room for a balanced peacetime space program for the benefit of the economic development of this country and other countries as well for the exploration of space, don't you?

Dr. METTLER. Yes, I do. I simply feel that a single monolithic agency would not really, in the end, give the country what it needs and wants.

Mr. FULTON. I believe that space is too important to be devoted solely to military purposes. Space is infinite, and that would mean that a greater part of the universe is going to be of military assignment, when as a matter of fact to me it should be peaceful.

One other point I would like to make, and I am through: I was a United States delegate to the United Nations in the 14th General Assembly. I was there when the Soviets presented a model of their Sputnik, a beautiful full-scale model for the public foyer of the United Nations Building in New York City. It made quite an impression on every delegate there, and of course it makes quite an impression on every person who comes in the foyer.

I am proposing a resolution for the United States to do likewise, and I very frankly can't get much enthusiasm for it, either to put up a Pioneer V or an Explorer VI, for example. Then it could be changed by the agency as we make new developments, but at least at the present time when we have a second Pioneer V not in use, don't you think that would be a good idea to display it for people to see as an example of our United States development in space?

First, don't we have such a second unused Pioneer V, and secondly, don't you agree that we should do some of this international advising and selling and showing the benefits of our space program?

Dr. METTLER. I definitely agree that emphasizing the international scope of an experiment of this kind to all nations of the world is an excellent idea, and I would be happy to assist in putting a model in the lobby of the United Nations, for example, as you suggest. There are, in answer to your question, both models of the shell and models of the paddles that are indistinguishable from the actual solar cells. I really wouldn't suggest putting actual solar cells in the lobby.

Mr. FULTON. No.

Dr. METTLER. And there are spare components that were used in the environmental test program of the actual internal pieces that might be used.

Mr. FULTON. I won't take the time now, but could you submit a memorandum for the record at this point outlining what would be practical in that regard on the kind of a model of Pioneer V that you are speaking of?

Dr. METTLER. I would be very happy to do so.

The CHAIRMAN. The gentleman's time has expired.

Can you do that in the next few days, so we won't hold up the manuscript?

Dr. METTLER. Yes. I can do that in 2 or 3 days.

The CHAIRMAN. All right. If you have got an extra model of Pioneer V, why, let us have it for this committee room, too. [Laughter.]

SPACE TECHNOLOGY LABORATORIES, INC.,
Washington, D.C., April 4, 1960.

Hon. OVERTON BROOKS,
Chairman, House Science and Astronautics Committee,
New House Office Building,
Washington, D.C.

DEAR MR. BROOKS: In accordance with a request made by Mr. Fulton during my appearance before the House Science and Astronautics Committee on March 31, I am submitting to you this memorandum for the record concerning the practicality of displaying a model of Pioneer V at the United Nations Building in New York. Later in my testimony, Mr. Van Pelt also made reference to placing a model of Pioneer V under the Capitol dome.

Upon more detailed examination, and after discussion with NASA, I find that there are available several realistic sheet metal and wooden replicas of Pioneer V which could be used for the type of display which was suggested. The matter of the display of actual spare parts of Pioneer V is somewhat more complicated, since it is hoped that some of these spare parts can be reworked and reused for ground testing in connection with the development of later space probes.

I have discussed the question of Pioneer V displays with Mr. Horner of NASA and have been informed by him that NASA has proposed to the State Department the possibility of placing a model at the United Nations. This proposal is currently under consideration by the State Department and it is my understanding that you will be advised of their decision when it is available. Space Tech-

nology Laboratories, Inc., will be glad to assist in making the display possible as needed.

I would suggest that further correspondence on this subject be directed to NASA. May I thank you once again for the opportunity to appear before your committee.

Sincerely,

W. CHEWNING,
Executive Vice President
(For Ruben F. Mettler).

The CHAIRMAN. Mr. Van Pelt?

Mr. VAN PELT. Mr. Chairman. I am not one who is enthusiastic over the United Nations. If I were going to place a model someplace, it would be under the Capitol Dome.

The CHAIRMAN. Why not the committee room?

Mr. VAN PELT. We don't get the traffic through here.

Dr. METTLER. I can send a memorandum on that too, if you want.

Mr. VAN PELT. All right.

Earlier this year in our hearings we heard great concern over our losing prestige among the free nations, and our allies, so to speak. I am wondering whether the accomplishments of Pioneer V alone—do you have any feeling, or can you comment on it? Has our prestige gone up with some of these countries?

Dr. METTLER. I think you are asking a little bit for the relative of a baby to comment on the babies in a baby contest. [Laughter.]

But I do believe that as the full scope and impact of Pioneer V sinks in, and the enormous distances and the imagination-capturing notion of actually talking and commanding things that far away, as these things sink in, I do believe that the impact on the world will be considerable.

I have had in my office out in Los Angeles a rather heavy correspondence, including schoolchildren. I have one from Italy, one from Indonesia, as a matter of fact. So I believe the world response has been rather remarkable.

Mr. VAN PELT. Would you have any knowledge as to what we are doing, as far as the Voice of America or the Crusade for Freedom in Europe is concerned?

Dr. METTLER. I am sorry, I just don't know.

Mr. VAN PELT. Thank you.

The CHAIRMAN. Doctor, I have a question or two, and I think Mr. McDonough has a question or two. Maybe some of the others do, as well. I want to ask you this: When I was down the other night and got that direct answer to the command-order to the satellite, the temperature there on the outside was 27°. You tell me it is now 30°. Now at that time what was the temperature on the inside? Was it 68°?

Dr. METTLER. I believe that is correct. I think your memory is right.

The CHAIRMAN. What is it on the inside?

Dr. METTLER. It is about 85°, I would guess.

The CHAIRMAN. It is gradually going up, is it?

Dr. METTLER. Yes, as it approaches the Sun—since it is getting closer to the Sun—the temperature slowly goes up, and this of course is in itself really a very sophisticated physics problem. The satellite has what we call a temperature control system, and it must be so designed that its temperature doesn't go up too far. It was designed

and environmentally tested on the ground before it was launched to cover what we estimated to be the range of temperatures. It is now turning out that the analyses made before launch were almost exactly correct, so that we expect the internal temperature to rise to about 120° and the temperature of the paddles, the solar cells on the outside, to go up probably another 20°.

The CHAIRMAN. Will it operate all right at 120° inside?

Dr. METTLER. Yes, it has been tested to that temperature.

The CHAIRMAN. And as it approaches the Sun will it gradually disintegrate?

Dr. METTLER. No, because it is really going around the Sun.

The CHAIRMAN. You don't expect it to orbit gradually into the Sun?

Dr. METTLER. No. If this is the Sun [indicating], its orbit is such that at one point it is relatively closer to the Sun than at another, so that it is in an elliptical orbit around the Sun.

The CHAIRMAN. Won't it gradually move into the Sun as it orbits?

Dr. METTLER. Not in any finite time. I mean hundreds of thousands of years before it would.

The CHAIRMAN. So it won't burn up, then?

Dr. METTLER. We do not expect it to burn up.

The CHAIRMAN. I yield to my colleague.

Mr. MCDONOUGH. Do we know what the gravitational pull of the Sun is?

Dr. METTLER. Yes. We have good estimates of the gravitational constant by measurements made on the Earth, which is, of course, itself a satellite around the Sun. The data gathered from Pioneer V will contribute to this understanding because it enables one to compare where it was calculated to go, which depends on gravity, and where it actually goes during its flight. We have quite good information on the Sun's gravitational pull, but I think this will make it better.

Mr. MCDONOUGH. From what I have learned of it and read of it, the closest point that Pioneer V will be to the Sun is about 20 million miles closer to the Sun than the Earth is.

Dr. METTLER. That is almost exactly right, yes.

Mr. MCDONOUGH. At the closest point?

Dr. METTLER. That is right, yes.

Mr. MCDONOUGH. And at that point it would be about 74 million miles away from the Earth—70 million, say? Ninety million to the Sun and 70 million—from the Earth.

Mr. FULTON. No, 20 million miles closer to the Sun from the Earth would put you 20 million miles from the Earth, 74 million miles.

Dr. METTLER. It is hard for me to talk on this without a blackboard. What happens is that the Earth and Pioneer V are both going around the Sun, and Pioneer V is going faster, so that it goes around the Sun approximately every 311 days; the Earth goes around approximately every 365 days. So that the two go like this [indicating], and will gradually separate.

The CHAIRMAN. My time has expired. I will recognize Mr. McDonough.

Mr. MCDONOUGH. Both are elliptical orbits?

Dr. METTLER. Yes, although the Earth's orbit is not as elliptical, it is close to circular.

Mr. McDONOUGH. But the thing I was trying to get at is that at the closest point that Pioneer V will be to the Sun, we do not anticipate that it will disintegrate because of the radiation from the Sun at that point?

Dr. METTLER. We do not.

Mr. McDONOUGH. Have we tested out the 150-watt power unit on Pioneer yet? Do we know whether it is going to work or not?

Dr. METTLER. We have not turned it on in space. We, of course, tested it very, very thoroughly in vacuum chambers, on shade tables, and in every conceivable fashion while it was on Earth, and it has been operated many, many times. It has been turned on and put into an altitude or vacuum chamber and soaked, as we call it, in vacuum, and has functioned well. There were development problems during the course of its design and construction, but during the last several months prior to launch it was working properly.

Mr. MOELLER. Will the gentleman yield?

Mr. McDONOUGH. Yes.

Mr. MOELLER. Is there a device aboard to register the number of meteorites that might be struck by this capsule?

Dr. METTLER. There is a device that registers the number of dust particles of small size. If it were struck by something as large as this cup it would probably demolish the satellite. But there is what we call a micrometeorite detector, and it is registering hits from small dust particles.

Mr. McDONOUGH. Mr. Fulton, I yield to you.

Mr. FULTON. No, I would rather wait for my time.

Mr. McDONNELL. Very well.

Insofar as the sophistication of Pioneer V is concerned; that is, the detail that we have in it to transmit information to Earth, we are developing satellites that will provide more information, are we not, for future shots?

Dr. METTLER. Yes.

Mr. McDONOUGH. And are we developing a satellite that will orbit Venus and give us this information like we are getting from orbiting the Sun?

Dr. METTLER. There may be in the NASA plans, a Venus-orbiting satellite which I personally don't know about. To my knowledge, there is not a Venus-orbiting satellite planned for the next time that Venus, itself, is in proper position.

The CHAIRMAN. Will the gentleman yield?

Mr. McDONOUGH. Yes.

The CHAIRMAN. Doctor, I want to ask you this: Now, the fact that we are able to send an order out to that satellite 2 million miles out and get a response, doesn't that have terrific impact on the future? For example, we could send a satellite around the Earth, and at any time order it to either explode or drop a bomb, or dive into the Earth, or otherwise control it as we like; isn't that right?

Dr. METTLER. In principle, it is. An order to make it do something which does not require very much power in the satellite is relatively easier than an order to make it do something that takes new energy. Remember, the battery, that has to be charged by solar cells. But in principle what you say is correct: The ability to command a spacecraft at great distances and to cause it to perform functions in

accordance with instructions has been clearly and without question demonstrated to be feasible.

The CHAIRMAN. It has a terrific impact.

Mr. Fulton?

Mr. FULTON. Who owns the parts of Pioneer V that we were speaking of? Does the company own them or does the U.S. Government?

Dr. METTLER. I guess I don't know which——

Mr. FULTON. These spare parts that we might use for United Nations or public display.

Dr. METTLER. I am glad you asked that question. They are the property of NASA, and the disposition of those parts must be worked out with NASA, and before I could write my memo I would immediately have to leave here and talk to them about it.

Mr. FULTON. Now, this Pioneer V brings us up with some remarkable orbital predictions. For example, Pioneer V is moving closer to the Sun and faster than the Earth in its orbit around the Sun. At the present time Pioneer V would have its most elliptical orbit, and of course would be operating under both Newton's law as well as Kepler's second law on speeds.

Now, isn't it a fact that as time goes on, instead of having a narrow elliptical orbit, Pioneer V will tend to have an annular circular orbit, and will tend likewise to come to a constant speed just slightly above the Earth's speed of 70,000 miles an hour around the Sun in its orbit. But the peculiar thing about it is this: It will be a lumpy orbit, and because of the faster speed it will really tend to be an orbit which is not being repeated except once in a tremendous number of thousands of years. In each case that it goes around it is gradually going to be more circular, and it will always have the influence of the various planets on it and the influence of the Earth will be the nearest planet to it in all probability, so that it will always have the Earth and the Moon in a different conjunction. So the remarkable thing about this Pioneer V is it won't have a regular, repeating orbit every 311 days, but will tend to be a planet in and of itself that will be orienting itself through these thousands of years?

Dr. METTLER. In principle, what you say is correct. I think it requires a new definition of time to visualize this. The forces acting on it will be very, very small, and in our lifetime it will appear to be rather stable in its orbit.

Mr. FULTON. Yes. I spoke in terms of thousands of years.

Dr. METTLER. Very long time; that is correct, sir.

Mr. FULTON. So that really, if we were going to make some sort of an experiment on Einstein's theory of the bending of light when it goes around a large body, because this Pioneer V is moving over behind the Sun, won't we have some experiments on the direct line of sight communication as it comes around the Sun's aura? You see, could we in any way show on a broad distance that the theory that Eintsein speaks of, as to a curved universe or the curvature of light, may have some aspects of truth? Could this vehicle be used for that purpose?

Dr. METTLER. I really don't know. In principle, it might. I simply haven't thought about it enough to really answer your question.

The CHAIRMAN. We want to thank you very much, Doctor, for some very fine testimony, very helpful to the committee.

Mr. YEAGER. Mr. Chairman, may I get permission from the committee to incorporate in the record at the appropriate point the statement of three witnesses who will not appear due to the revised schedule. Those witnesses are Joseph Campbell, Comptroller General of the United States; Dr. Vannevar Bush; and Dr. Hilliard Paige, director of Missile and Space Vehicle Division of General Electric Co.

We would also like to incorporate certain correspondence to the committee bearing on this legislation.

The CHAIRMAN. Yes.

I wish you would express the deep regret of the committee that we were not able to hear them at this time.

Mr. FULTON. May I congratulate the witness on his fine statement and his good answers.

Dr. METTLER. Thank you.

The CHAIRMAN. The doctor is a brilliant witness. We are happy to have had you, Doctor.

We will adjourn until Monday morning, at 10 o'clock.

(Whereupon, at 11:58 a.m., the committee adjourned, to reconvene at 10 a.m., Monday, April 4, 1960.)

(The statements referred to above are as follows:)

STATEMENT OF DR. VANNEVAR BUSH

The problem of the appropriate organization of space research and development is complex, because of diversity of objectives and the inevitable complication of governmental organization. I believe it may help clarify the subject if it is broken down into four aspects.

1. The military aspect.
2. The propaganda phase.
3. The short-term scientific objectives.
4. The long-range aspects.

Let me comment on each of these.

There is no question that the military aspects are of supreme importance. They involve the development and production of long-range ballistic missiles, and in particular their range, precision, reliability, and protection against surprise attack. Beyond this lies the exceedingly difficult problem of the antimissile missile. We cannot fail to press forward energetically and wisely on all these matters. I am not one who is terrified by the so-called missile gap. The risk of enemy attack is not greatly influenced by whether we are slightly ahead or behind in the race; it becomes appalling only if we are so foolish as to lag behind to such an extent that we might be overwhelmed before we could retaliate. We must not fail to put concentrated effort into assuming that we at least equal, and if possible excel, in bringing the long-range missile to the point of full precision and reliability. Nor can we afford to lag in examining the countermissile in all its forms. The solution of this latter problem may look to be impossible on the face of it. But we need to remember that, soon after the war, the attainment of precision in an intercontinental ballistic missile appeared equally difficult.

I do not need to emphasize that our military missile program has been full of confusion in the past 10 years. In fact, the astounding Russian progress has been due to the fact that, in a dictatorship, it is possible arbitrarily to concentrate effort on single objectives, and discard others. Russian scientists are brilliant, but no more able than are ours. I feel sure our engineers are better than theirs, and the development of missiles is largely an engineering job. But we have scattered our efforts at times, and we have been simultaneously doing many other things, some of them of great importance indeed, and some of them trivial by comparison. We are not organized as well as we might be for military effort during a period of relative peace.

I can pass over the details of this subject and turn at once to the heart of it. No organization will ever work well in its details unless it is utterly sound at the top. No complex developmental program will ever be consistent and well integrated unless the overall planning function is ably performed. The simple

fact is that we do not have a sound system of top level military planning. The Joint Chiefs of Staff system does not work for its intended purpose. We have three sets of plans and three programs, not a single integrated plan. The reason for this is utterly clear.

The senior commanding officers of the services, with their heavy responsibility for their own organizations cannot be expected to function as a planning body, or to sit in judgment on the plans of their members. This involves no criticism of individuals; many of the Joint Chiefs have been very able officers indeed; many of them also are good friends of mine. It is the system that is wrong, and that has been wrong ever since unification was undertaken. The lack of integrated military planning at the top cannot be resolved by the Secretary and his civilian aids. They can hardly be expected to become expert military planners overnight. Nor, for that matter, in these rapidly moving days, can men of military training alone grasp scientific trends adequately in order to plan wisely. A sound system would be one in which top level military planning would be conducted by a body of military men, of equal eminence and rank to the Joint Chiefs, on their last assignment before retirement, divorced completely from the services in which they served, backed up by a staff of brilliant young officers completely under their control and protected against discrimination because of this assignment, backed up also by consultants and advisers drawn from the most able scientists and engineers of the country. We have nothing of the sort. Unless and until we secure it, we will proceed amid confusion and cross-purposes.

Let me now turn to the propaganda phase of the whole effort. We lost the first round on this subject. In all probability we will lose the next round. It hurts our pride, and it has done some good in shaking us out of our smugness. But I do not think it has done us a great deal of injury in our relations with the hesitant nations of the world. They are going to look much more deeply into our strengths and intentions than the question of who first shoots the Moon, or puts a man into space. Incidentally, on this latter, I trust we will not act prematurely, urged on by our pride, and kill some promising youngsters in the process. If we do we will certainly witness a public reaction which will hamper far more important parts of the program.

Putting a man in space is a stunt: the man can do no more than an instrument, in fact can do less. The days when men will be in space for long periods and for varied purposes, are so far off that we need not hurry on one aspect of their reactions and potential operations. There are far more serious things to do than to indulge in stunts. As yet the American people do not understand the distinctions, and we in this country are prone to rush, for a time, at any new thing. I do not discard completely the value of demonstrating to the world our skills. Nor do I undervalue the effect on morale of the spectacular. But the present hullabaloo on the propaganda aspects of the program leaves me entirely cool.

Some of the scientific results flowing from the successful launching of satellites are valuable and intriguing. I have watched with keen interest as we have learned more about the form of the Earth, and the nature and composition of the gas envelope which surrounds it. The extraordinary feat of bouncing a radio message off of the Moon, or a satellite, is inspiring. There is much more to learn.

Yet I have to take, as an old hand at the subject, a coldblooded view on any program of research. I have to ask what it costs. I also have to compare the program with other possible programs which might be carried on at the same cost, and at the same utilization of our all too limited scientific and engineering talents. When I do so, I am caused to pause. I conclude that we are overemphasizing this whole affair.

There is so much we do not know, and which we are relatively neglecting. We know as yet little of the mysterious process by which the genes in a cell can mould the entire growth and development of an organism of a man. We have just begun to understand the depths of the Earth under our feet, or the cause of the great ocean currents. We know that minute organisms can extract rare elements from sea water, and we suspect that some day we may be dependent upon their doing this for us, but we do not know how they do it. We make progress in conquering disease, and we feel that our relations with emerging nations may depend greatly upon our ability to help them in this regard, yet we spend as much on a few missiles as upon this entire complex subject. Of all the vast sums we spend each year on research, only 6 or 8 percent is devoted to that basic and fundamental research, in biology, chemistry, physics, and mathematics, upon

which our prosperity and stature in the next generation may indeed depend. Thus, while I acclaim the scientific results being obtained in space research, I feel that we in this country, with our youthful adherence to that which is new and spectacular, are far from a wise balance in our efforts.

On our organization for this part of our program, I have little to offer. I felt that it was a mistake, when the National Advisory Committee for Aeronautics was transformed into the National Astronautics and Space Administration, to discard the unique form of organization under which the former had operated highly successfully for 40 years. I hold no brief for government by committee. But neither do I approve an operating organization without the equivalent of a board of directors. Still the new organization seems to be working well, thanks to the presence of very able personnel at the top, and as long as we have fully able administrators and scientific directors, the exact form of organization otherwise does not matter too much.

Finally, let me say a word about long-range aspects of this whole matter. I read everywhere that we are soon to put platforms in space and inhabit them, that we are going to make trips to Venus. I also read, written by those who do not understand relativity, that we are going to annihilate time and travel to the stars. A great deal of this is simple unadulterated absurdity. Some of it is real. I will not be surprised if some of these dreams ultimately come true, first because I will not be around to witness it, and second because it is foolhardy to set limits on what man may ultimately accomplish, provided one does not blithely disregard some of the simple laws of physics. In the meantime, I fear that we are presenting a very distorted picture to the youth of the land, among whom are the scientific leaders of the next generation.

Certainly it is fine to dream of these things, one would hardly wish to cramp the imagination of youth. But this is a far cry from spending cold tax dollars on aspects of a subject which cannot come to fruition for a generation or two. Certainly, today, there are aspects of the matter which warrant concentrated attention, and which are important in their own right for other purposes, such as control of the energy of fusion, or more intricate and versatile analytical and computing mechanisms, or new methods of communication, or synthesis of foods.

Some day, long after we are all gone, men may fly about the solar system in space vehicles. But, if I were suddenly dropped on an isolated island, I would spend some time studying means of being adequately fed, clothed, and sheltered, in examining the resources of the island, before I started to bind logs together with vines to undertake a thousand-mile voyage. I have no quarrel with those who wish to plunge in and design now the ultimate space vehicle, if they enjoy doing so. I just do not want to join them. There are far more interesting scientific problems in the world than this. I had rather follow leads that appeal only after deep study, than to follow a spectacular vision which may vanish into the mists. Let us by all means look forward in every way, and not neglect the fact that man may some day even cease to be entirely dependent for his continued existence upon this old earth of ours. But let us not go crazy about it.

I hope that this brief analysis of the problem will be of some aid. I know full well that some of the things I have written will be vigorously opposed. I may even be accused of being so old that I can no longer see ahead. I trust you will have the opposite point of view fully expressed. I merely hope that, as this is done, the accepted forms of logical argument are not completely disregarded, and the limitations imposed by our present concepts of physical law are not dismissed with the statement that science can do anything whatever, if merely given enough funds.

STATEMENT OF JOSEPH CAMPBELL, COMPTROLLER GENERAL OF THE UNITED STATES

MARCH 29, 1960.

B–141387.

Hon. OVERTON BROOKS,
Chairman, Committee on Science and Astronautics,
House of Representatives.

DEAR MR. CHAIRMAN: Further reference is made to your letter of February 19, 1960, requesting a report on H.R. 9675, 86th Congress, 2d session, "A bill to amend the National Aeronautics and Space Act of 1958, as amended, and for other purposes."

A number of comprehensive amendments and incidental technical modifications are proposed by the bill with respect to the responsibility and administration of

the National Aeronautics and Space Administration (NASA), and the procurement authority of the administration. The proposed administrative amendments involve policy determinations by the Congress and have received considerable study by your committee. We have no comments on these proposals.

The procurement amendments proposed are designed primarily to extend to NASA authority similar to that exercised by the several military departments under existing statutes and regulations but not presently available to NASA under the Space Act of 1958. The proposed provisions would permit uniformity of action as between the Department of Defense and NASA in the areas which would be affected. The proposals seem consistent with the general purpose and intent of Congress as evidenced by the National Aeronautics and Space Act of 1958 establishing NASA, section 301(b) of which provided for the administration's utilization of the authorization and procedural requirements governing "Procurement Generally" by the Armed Forces set out in chapter 137, title 10, United States Code, and NASA has implemented the authority thus provided by adopting the pertinent provisions of the Armed Services Procurement Regulation (ASPR) to the extent practicable. The procurement amendments proposed deal with—

1. The leasing of Government-owned property for other than a monetary consideration;
2. The acquisition of releases for past infringements of patents;
3. The disposition of patent rights under research and development contracts;
4. The indemnification of contractors under such research and development contracts for liabilities arising out of unusually hazardous risks; and
5. The waiver of the performance and payment bond requirements of the Miller Act.

We will consider these matters in the order in which they appear in the bill.

1. LEASING AUTHORITY

Subsection 6(D) of section 1 of the bill would amend the clause following the first [second] semicolon in section 203(b)(3) to permit provisions in leases of real or personal property whereby the maintenance, repair, or restoration of the property leased may be accepted as part or all of the consideration for the lease, notwithstanding the provisions of 40 U.S.C. 303b requiring money consideration, or any other provision of law. Similar authority has been granted to the military departments under 10 U.S.C. 2667(b)(5). We see no objection to this amendment.

2. PAST INFRINGEMENTS OF PATENTS

Subsection 6(F) of section 1 of the bill would add to section 203(b) a new paragraph (14) authorizing the administration "to acquire releases, before suit is brought, for past infringement of patents." Similar authority has been granted the military departments under 10 U.S.C. 2386(4). This authority will permit the administrative settlement of claims for infringement of patents prior to suit where such action is found to be in the interest of the United States, and should result in the realization of savings in the cost of settling claims of this type.

3. PATENT RIGHTS

Subsection (11) of section 1 of the bill sets out new provisions which would supersede and liberalize the existing provisions of section 305 of the 1958 act governing "Property Rights in Inventions" arising from the performance of work for NASA.

The present section 305 of the act of 1958 provides, in general, that any invention made in the performance of any work under any contract of the Administration becomes the exclusive property of the United States unless the Administrator waives all or any part of such rights in conformance with the provisions of the section. Subsection (a) of section 305 proposed by the bill would require each contract or other arrangement, and all tier subcontracts thereunder, having as one of its purposes the performance of experimental, developmental, or research work, to contain such provisions as may be prescribed by the Administrator governing the disposition of the rights to inventions conceived or first actually reduced to practice thereunder in a manner calculated to protect the public interest and the equities of the contractor. Subsections (b) and (c) of the proposed section 305 would provide for the waiver of the rights of the United States to such inventions under contracts

providing for the vesting of title in the United States and where such rights have heretofore vested in the United States, subject to the reservation of an irrevocable, nonexclusive, nontransferable, royalty-free license for the practice of such invention throughout the world by or on behalf of the United States or any foreign government pursuant to any treaty or agreement with the United States. This would permit NASA in dealing with contractors of the Department of Defense on similar types of research and development work or on projects jointly sponsored to agree to provisions mutually acceptable to the military departments. The present policies and practices of the military departments are not prescribed by specific statutory provisions but are governed by section IX of the Armed Services Procurement Regulation which provide that, as a general rule, the contractor retains patent rights with the Government receiving a royalty-free, nonexclusive license to use any invention conceived or first actually reduced to practice in the course of performing the contract work.

We recognize there are many divergent views on the subject of the ownership of patents developed by private concerns under research and development contracts with the Government. Yet, we believe there can be little disagreement as to the need for uniformity where contracts are being performed in the same or similar research and development areas. Whether the policies should provide generally for retention by the Government of patent rights, or for the granting of those rights to contractors with licenses for Government use, or other alternates, is a matter for determination by the Congress.

In a report of March 10, 1960, to the chairman of the House Committee on the Judiciary (copy of report enclosed) on H.R. 5448, 86th Congress, which would establish one uniform Government policy with respect to patent rights under research and development contracts, the various problems and aspects of the matter were discussed. We suggested in that report that in lieu of establishing one uniform policy, consideration might be given to legislation which would give recognition to the functions and problems peculiar to the activities of individual agencies, as well as the differences in the types of research and development being contracted for by the Government. Such legislation might appropriately set forth broad general policies, including basic principles, guidelines, and criteria, permitting a measure of flexibility in administration where circumstances so dictate, and might embrace some features of the present administrative practices and methods.

We stated that we believed such legislation could give full regard to all considerations designed to serve and protect the national interest, the Government, and contractors. Also that legislation along these lines would facilitate improved methods and practices for administering and carrying out the extensive research and development programs of the Government, and bring about a degree of standardization in the handling of patent rights.

We have studied the committee print of the report of the subcommittee on patients and Scientific Inventions of this committee on the proposed revisions of section 305 and it is noted that the subcommittee has concluded that the present provision of section 305 is tending to complicate and retard the conduct of the American space program. The question as to the need for amendment to section 305 at this time and that of the basic policies to be incorporated in such amendment are for determination by the Congress. However, if such an amendment is enacted, we believe it should be considered as an interim measure and in the event Congress should later enact overall legislation setting forth basic general policies governing patent rights on research and development contracts for all Government agencies, the patent provisions of the 1958 act, including any amendments which may have been enacted should be brought along with those policies.

4. INDEMNIFICATION OF LIABILITIES

Subsection (13) of section 1 of the bill would add a new section 308 captioned "Indemnification" to title III of the 1958 act using language almost identical with that of 10 U.S.C. 2354 granting such authority to the military departments. We understand the purpose of this proposal is to give NASA the same authority as that now enjoyed by the military departments to indemnify contractors for unusually hazardous risks; that the proposal has been made as an interim measure pending further consideration of more comprehensive legislation (H.R. 4148) requested by NASA at the beginning of this session of Congress. However, we believe there are a number of deficiencies in the

provisions of 10 U.S.C. 2354 which should be considered in connection with the provisions for granting the authority requested by NASA.

Under the proposed section the Administrator would be authorized to approve provisions in research and development contracts for indemnifying the contractor, "but only to the extent that they arise out of the direct performance of the contract and to the extent not compensated by insurance or otherwise" for (1) claims (including reasonable expenses of litigation or settlement) of third persons, including the contractor's employees, for death, bodily injury, or loss of or damage to property; and (2) for loss of or damage to the contractor's property, "from a risk that the contract defines as unusually hazardous."

Subsection (b) would require that a contract providing for indemnification must also provide for notice to the United States of any claim or suit against the contractor by third persons and for control of or assistance in the defense thereof by the United States at its election. Subsection (s) would require certification by the Administrator as to the reasonableness of all payments under subsection (a), and subsection (d) would authorize payments of approved claims from funds obligated for performance of the contract, funds available for research and development not otherwise obligated, and "funds appropriated for those payments."

The legislative history of the provisions of 10 U.S.C. 2354 which are derived from Public Law 82–557 approved July 16, 1952, 66 Stat. 726 (5 U.S.C. 1952 ed., 235f, 475k, and 628f), discloses a congressional intention and purpose to unify the procedures of all components of the Department of Defense in the handling of indemnification under research and development contracts. The legislation grew out of representations by the military departments that considerable difficulty had been experienced in obtaining responsible contractors in cases where the work involved unusually hazardous risks and the possibility that disastrous incidents might occur resulting in huge liability claims and possible bankruptcy; that in some instances there had been no insurance coverage available and, in others, the exorbitant premiums charged had made the securing of insurance prohibitive.

See Report No. 1397, May 26, 1948, of the Senate Committee on Armed Services, 80th Congress, 2d session, "Facilitating the Performance of Research and Development Work by and on Behalf of the War and Navy Departments," to accompany S. 1560, a predecessor to H.R. 1180 which was ultimately enacted; report of hearings before a subcommittee of the Committee on Armed Forces of the Senate, 82d Congress, 1st session, on H.R. 1180, September 25, 1951, pages 13–14; House Report No. 28, June 6, 1951, hearings on H.R. 1180, 82d Congress, 2d session, pages 618–635; House Report No. 548, June 12, 1951, of the Committee on Armed Services, 82d Congress, 1st session, pages 2–4; and Senate Report No. 936, October 11, 1951, of the Committee on Armed Services, pages 4–5.

We have received advice from the Office of the Secretary, Department of Defense, that uniform procedures prescribing the policies and criteria and the contract provisions for utilization of the authority granted by 10 U.S.C. 2354 have not been adopted by the Department of Defense. This authority has not been implemented in ASPR, and apparently the only directive issued thereon by the military departments is Navy Procurement Directive No. 10–351. Furthermore, the statutory provisions are not as clear as they might be, which has given rise to a number of problems involving uncertainty as to the coverage and the extent of obligation intended, including the following which are suggested for consideration and possible clarification should such authority be extended to NASA as proposed by the bill:

COVERAGE

Under the bill, as under 10 U.S.C. 2354, the phrase "research and development" is not defined; the definition of "unusually hazardous" is left to the contract; and the clause "but only to the extent they arise out of the direct performance of the contract" indicates that a limitation on the coverage authorized apparently was intended. A question is presented as to whether the language providing for indemnification of liabilities arising out of the direct performance of research and development contracts is intended to include product liability arising after completion of a contract covering the initial research or development of an item, and to what extent. It seems clear the language does not include subsequent production contracts of the item although the same or similar unusually hazardous risks might be involved.

On the other hand, this language might reasonably be construed as authorizing indemnification for a liability which may arise long after the research and development contract has ended; that is, where the liability is attributed to an act or omission which may have occurred during the direct performance of the contract, such as a latent defect in an item delivered thereunder. No limitations are specified in the bill as to the time for the filing of claims, giving rise to the further question of whether such claims barred by State statutes of limitations may be administratively considered for settlement thereafter.

In the interest of uniformity in construction and application it is suggested that "research and development" should be defined; that "contractor" should be defined, expressly stating whether major subcontractors and their various tier subcontractors may be covered; and that specific criteria for determining "unusually hazardous" risks should be included in the bill. It is also suggested that consideration be given to clarification of the proposed provisions to show whether the indemnification authority granted is exclusive.

The provisions of 10 U.S.C. 2354 apparently do not authorize indemnity against damages or losses resulting from the negligent acts of the contractor and its employees. However, the indemnification provisions which have been utilized by the military departments expressly exclude liabilities which result from willful misconduct or lack of good faith on the part of the contractor's directors, officers, managers, superintendents, or other equivalent representatives, thereby implying that liabilities resulting from the negligent acts or omissions of the contractor and its employees are covered.

The rule is well settled that a contract of indemnity will not be construed to indemnify the indemnitee against losses resulting to him through his own negligent acts where such intention is not expressed in clear and unequivocal terms. See *Griffiths* v. *Broderick* (Wash. Sup. Ct., June 4, 1947, 182 P. 2d 18), and the cases collected in the annotation (175 A.L.R. 8, at p. 30). *Cf. Booth-Kelly Lumber Co.* v. *Southern P. Co.* (9th U.S.C.A., June 28, 1950, 183 F. 2d 902, 20 A.L.R. 2d 695, at 715). Clarification of the provisions proposed by the bill to show expressly whether coverage of negligence is intended is suggested.

The extent of the liability apparently intended to be covered might reasonably be clarified by changing the pertinent language to read "to the extent that they arise out of an incident or disaster occurring during the direct performance of the contract and to the extent not compensated by insurance or otherwise." This would serve to make the provisions of indemnification more definite and would preclude the consideration of claims for "product liability" arising after the research or development contract has been terminated by performance or cancellation. *Cf. MacPherson* v. *Buick* (Ct. App. N.Y., 1916, 111 N.E. 1050), and *Dalehite* v. *United States* (1953, 346 U.S. 15).

We also feel that definite limits should be fixed within which such claims might be filed for administrative consideration and settlement under the contract. Also, a requirement that settlement of such claims be supported by administrative findings seems desirable.

EXTENT OF OBLIGATIONS

In addition to the uncertainties indicated whereby the indemnity provisions proposed to be authorized might be unlimited in time as to when a liability might occur and be claimed, the language of the bill, as in 10 U.S.C. 2354, is vague and ambiguous as to whether the indemnification provisions authorized permit the incurrence of obligations for payments prior to the appropriation of funds therefor, and no limitation as to the amount which the United States might be obligated to pay is provided.

The general rule is that, in the absence of express statutory provisions therefor, obligations of such indefinite and unlimited character are contrary to the provisions of existing law, sections 3679 and 3732, Revised Statutes (31 U.S.C. 665 and 41 U.S.C. 11), which prohibit the entering into of contracts beyond the extent and availability of appropriations. See also section 1311, act of August 26, 1954 (68 Stat. 830; 31 U.S.C. 200), *prescribing requirements for documentary* evidence of obligations. See, in this connection, 42 U.S.C. 2210(j), *expressly authorizing AEC in the administration of the indemnification authority* granted the Commission to make contracts in advance of appropriations and without regard to 31 U.S.C. 665, a limitation to 2210(c)(d)(e). Compare 35 Comp. Gen. 85, 87, and our report to you on H.R. 4148, 86th Congress, 1st session, April 27, 1959, B–138770. However, in considering the problems inherent in the

language used in this subsection, the Senate Committee on Armed Services stated in its report of May 26, 1948, supra, at page 4:

"* * * This provision would apply only where the loss was not compensated by insurance or otherwise. This provision is designed to cover contracts for the performance of hazardous work, in which the cost of insurance would be prohibitive. The net effect of the subsection is to make unobligated research and development funds available for payments due thereunder. In the absence of such funds, this subsection would give the contractor a cause of action against the Government, and would also give the service concerned a basis for recommending the appropriation of the necessary funds to make payments due under the contract."

The indemnification provisions currently in use by at least two of the military departments expressly provide that the rights of the contractor shall not be limited by the clause of the contract entitled "Limitation of Cost" which in effect imposes a contractual ceiling on the obligation of the Government to reimburse the contractor for incurred costs. This would seem to indicate an agreement to pay claims under the indemnification provisions without limit as to amount or availability of appropriations.

It is suggested that the committee may desire to clarify the proposed section by the use of language similar to that used in granting the AEC its authority, both as to making contractual commitments for indemnification in advance of appropriations and as to limitation of liability.

WAIVER OF THE MILLER ACT BOND REQUIREMENTS

Section 3 of the bill would amend 40 U.S.C. 270e so as to extend to NASA the authority granted the military departments to waive the performance and payment bond requirements of the Miller Act, with respect to cost-plus-a-fixed-fee and other cost-type construction contracts and with respect to certain other contracts regardless of the terms of such contracts as to payment or title. There appears to be no compelling reason for requiring performance and payment bonds under cost-reimbursable contracts, as the prime contractor must show payment to secure reimbursement. Furthermore, the proposed provisions would permit action by NASA consistent with that followed by the military departments in dealing with the same contractors. We see no objection to granting NASA this authority.

We trust that you will find our comments helpful to your committee and we will be glad to cooperate with you and your staff in the consideration of the bill.

Sincerely yours,

JOSEPH CAMPBELL,
Comptroller General of the United States.

GENERAL ELECTRIC CO.,
DEFENSE ELECTRONICS DIVISION,
MISSILE AND SPACE VEHICLE DEPARTMENT,
WASHINGTON DISTRICT,
Washington, D.C.

Hon. OVERTON BROOKS,
Chairman, Committee on Science and Astronautics,
House Office Building, Washington, D.C.

DEAR MR. CHAIRMAN: I appreciate this opportunity to submit to the committee the following material germane to our Nation's space efforts and regret that we could not find a mutually agreeable date for my appearance in person.

I understand that there will be a subcommittee established in the near future to look at various technical developments of the space programs. I will be happy to appear before that subcommittee, because if I have any expertness as a witness, it is as one of the many scientists and engineers engaged in the development of the space vehicles which constitute our Nation's entries into the space race.

In the present statement, I will first offer some thoughts on a balanced approach to our national space effort that will, I hope, put the much-discussed problem of organization in context with the total problem as I see it. I will then submit some comments on section 11, 13, and 14 of H.R. 9675.

NEED FOR BALANCED APPROACH TO OUR NATIONAL SPACE EFFORT

Importance of our space effort

The space programs of the United States and U.S.S.R. are an important part of the cold war pattern. General Electric's long-range analysis indicates that the pattern of competition between the United States and the U.S.S.R. is presently shifting and that in the immediate future, as well as for the long run, reliance will be placed less upon military weapon systems and more and more upon the use of economic, political, and psychological strategies to maintain and further the prosecution of the cold war. It is clear, in this respect, that the technological advances being made by both the United States and U.S.S.R., especially those in the field of space exploration, have psychological and political overtones that do not escape the notice of the rest of the world. I feel that George Allen, Director of the U.S. Information Agency, expressed very well the importance of our space efforts in his recent congressional testimony in which he pointed out that "our space program may be considered a measure of our vitality and our ability to compete with a formidable rival, and as a criterion of our ability to maintain technological eminence, worthy of emulation by other peoples."

The four elements required for a successful space program

It is imperative that this challenge be met, and met with an approach that takes into account not only the short-range but also the long-range nature of this competition.

Any program needs four basic elements for success. These are—

Organization
A plan
The necessary resources
Strong leadership

I will discuss briefly each of these elements as it applies to our Nation's space program.

Organization.—Much attention and discussion is being given to this area, and your committee has heard divergent opinions from many distinguished witnesses. The controversy centers around whether the civilian and military space programs should be split or combined and whether, if combined, they should be under civilian or military control. There are good arguments both for and against each of these possibilities, but it is my opinion that if we were "starting from scratch" we would make more progress in less time, and the results would be more closely coupled to our needs in the cold war, if the programs were integrated and placed under military control.

I will not go into this viewpoint further, however, because we are not starting from scratch and what we should do if we were is largely academic. We are well down the road with the present organizational arrangement, and while I do not think that it is an optimum arrangement, I do feel that it is a workable one. In addition, of the four elements required for overall success, I believe that we are stronger on the point of organization than on the other three. Certainly, we should not disrupt the present arrangement just as it is getting going. If the present organization structure is given bold objectives, the required resources, and aggressive leadership, I believe we can more than hold our own in both civilian and military space achievements.

Planning.—No matter how soundly the national space effort is organized, it will not be effective without a set of plans that are matched to the Russian challenge.

These must start from a recognition that we are in a competition. There must be a clear-cut statement of national policy, that we intend to win this competition. Objectives must be established which will require an all-out effort to meet, and the meeting of which will clearly place the United States in a position of unqualified leadership.

We must set for ourselves the same type of high-priority, all-out goals in the space race that we have had in the missile race. If this Nation had two space-exploration programs with the same priority, boldness of approach, and insistance on results that have characterized the Atlas and Polaris programs, we would soon begin to regain some of the prestige we have lost in the space race to date.

I should like to point out that both of these highly successful programs started with a specific mission in mind. Plans were then made to develop the required subsystems and logistics support equipment on a time scale compatible with the

date set for achieving the mission capability. It is interesting to note that, in our space exploration program, we have reversed this successful approach. We are now developing the subsystems (Saturn first-stage booster) and will select the mission and set the date for achieving at some later time.

While it is certainly difficult to lay out plans 10 years ahead and there is a risk of losing prestige if well-publized objectives are not met, it would, perhaps, give to our space effort a greater sense of purpose and urgency if an imaginative mission were selected and a firm and difficult-to-meet date for its achievement.

Resources.—Along with an organizational structure and a plan, one must have the necessary resources. The two major categories of resources required for our space programs are money and technically trained manpower.

This country does not appear to be limited in resources insofar as money is concerned. The following statement, offered here in support of this point, is from the recent testimony of Robert Sprague, chairman of the Federal Reserve Bank of Boston, to the Senate Committee on Government Operations:

> "Now let us examine our response to the Soviet challenge. We are using less than 10 percent of our gross national product for all national security purposes, and the percentage is declining. Per capita disposable income—the amount we have left after paying taxes—is at an all-time high or nearly $1,900. It probably is $1,900 this quarter. It has risen about $325 per person—measured in 1958 prices—during the last decade.
>
> "If we were to devote only one-tenth of this increase to national security purposes, it would permit an increase of over $5 billion per year in our programs for national security.
>
> "We can see that the idea that an increase in spending for survival will bankrupt us is, to put a plain word on it, silly. The question is whether we are willing to use a small fraction of our increased wealth for the defense of our way of life."

I am not an expert in the field of national financial policy, but it seems to me that Mr. Sprague's viewpoint is a sound one. The problem does not appear to be whether we have the financial resources, but whether we are going to allocate enough of what we do have to compete successfully in the space exploration facet of the cold war, or use it for something else.

In regard to the other vital resource, technically trained manpower, it does appear that we are faced with a most serious shortage here and that it is at this area that we must take our longest range look. The problems or organization, plans, and the allocation of money have a lead time measured in years, but the lead time on obtaining technical manpower must be measured in decades. The training of a Ph. D. runs from about ages 6 to 26.

The problem is obscured by the fact that, at the moment, this not our limiting item in the space competition. Today, we have about the same number of scientists and engineers as the U.S.S.R. (a little over 1 million), and at present there are, in Government agencies and industry, experienced teams of scientists and engineers that are not being utilized to capacity. The cause for alarm is that, because the U.S.S.R. recognized the importance of this resource and started doing something about it many years ago, they are today graduating about three times as many scientists and engineers per year as we are. To add to the concern, their lead is showing a steady increase each year and ours is not.

I do not see how we can expect to match the Russian space and technological achievements on a long-range basis if we have only one-third the number of technologically trained people that they do, especially when, in the United States, the development and design of leisure and convenience goods uses a greater percentage of these people than it does in the U.S.S.R.

We must start to increase substantially our rate of development of this all-important resurce or we will surely lose the ability to compete in space of any other areas of technology in which we face competition with the U.S.S.R.

In concluding this section, I should like to say that the question may well be raised as to whether the U.S.S.R. scientist or engineer graduate is comparable to ours. During a 3-month tour and study of the Soviet education system, Dr. James Creese, president of the Drexel Institute of Technology, found no evidence that the U.S.S.R. was achieving quantity at the expense of quality. On the contrary, the selectivity of their admission of candidates to technical schools, and their emphasis on the training of engineers in the fundamentals of science and mathematics, gives us no cause for complacency. Dr. Creese has informed me that other educators who have visited the U.S.S.R. since his tour have generally confirmed his conclusions.

Leadership.—Even with good organization, plans, and resources, a program of such urgency and complexity must have strong leadership at all levels, from the President throughout the top echelons of direction. Such leadership is needed to select and inspire the key people, set policy and challenging objectives, assign today's resources, and develop those required for tomorrow.

The most urgent present need for leadership is in the area of resources—funds and technically trained manpower.

Although, as a Nation, we have adequate funds, strong leadership is needed to create awareness in the people of the importance of the space competition to our national prestige and security, to persuade them to support our space program wih the required dollars, to feel a sense of urgency, and to insist upon results.

The greatest need of all for strong and creative leadership lies in the development of technically trained manpower. It is most important that something be done on a national scale, or we will most certainly lose out not only in the space race, but also in the position of overall technical preeminence that we now enjoy.

COMMENTS ON H.R. 9675

I would now like to devote my thoughts to matters brought up by H.R. 9675, and comment on sections 11, 13, and 14, which seem to me to be of particular importance.

Section 11—Property rights in inventions

Section 11 would make it possible for NASA to follow, in general, the present practice of DOD under which the Government acquires a nonexclusive license to use, or let anyone else use for governmental purposes, inventions made by the contractor under a particular contract, but leaves with him the remaining rights for which the Government has no need. I believe this to be a great improvement over the much more restrictive patent provisions of the 1958 Space Act. I am afraid that unless we take prompt action in this area, we may not be sure of getting the maximum contractor contribution needed for optimum progress. I am firmly convinced that the new provisions would expedite and facilitate the negotiation of NASA contracts and offer contractors a greater incentive to contribute to NASA programs, without detracting in any way from the rights needed by the Government.

I am gratified to hear of the thoroughness with which this area has been studied by the special subcommittee which you designated for this purpose, and fully agree that the importance of this matter warrants such special attention. I understand that the subcommittee's recommendaions have now been adopted by the full committee, and sincerely hope that they will be included in the present bill when it is enacted.

Section 13—Indemnification

This subject is certainly one of the most pressing ones, and I strongly urge that indemnification, such as now available to AEC contractors, be provided by effective and comprehension legislation. The nature of the risk has been well stated by Dr. T. Keith Glennan:

"Potentially disastrous liabilities and losses may arise from activities involving applications of atomic energy, the use of high-potency propellants, the development, testing, and operation of space vehicles, and a whole range of novel undertakings on the fringe of the unknown. Such risks arise solely because of governmental activities. This fact makes it incumbent upon the Government to recognize the possible consequences of its activities and to make adequate provisions for them."

Operations involving the use of large boosters or the application of atomic energy could result in a catastrophic incident in which the financial loss and personal injury claims would not only be beyond currently available insurance coverage, but would also exceed the value of the assets of even one of the largest corporations. Under any presently available protection, it is difficult to imagine how the victims of such an incident would be compensated for their injuries. Fair and adequate compensation, in such a case, can only be obtained if the Government itself will provide full protection to contractors and the public, beyond amounts available through insurance.

Section 14—Coordination and cooperation

I mentioned earlier that we should not disrupt the present organization, which separates NASA and DOD on the basis of their different purposes.

While these purposes can be separated, there are many similarities between the activities required by each organization to fulfill its purpose. Coordination is needed to conserve the country's resources, especially its skilled manpower, without causing either NASA or DOD to fall short of its goal.

In our contracts with the responsible agencies, we have observed many areas in which desirable coordination has been achieved through informal cooperation at the working level. I believe, however, that in view of the many areas of similarity and the magnitude of the effort involved, a formal monitoring mechanism is needed. This should act not as a channel of communication, but rather as an assurance against possible gaps in communication. Such a mechanism should involve individuals at a high enough level so that they can understand the broad aspects of the programs, but not so high that they are not in a position to acquire specific knowledge of the problems, a prerequisite to realistic and constructive recommendations.

The Activities Coordinating Board suggested by Secretary Douglas, staffed with individuals with program and policy responsibilities, would appear to be at about the right level for such a formal mechanism.

Respectfully submitted.

H. W. PAIGE,
General Manager, Missile and Space Vehicle Department.

MARCH 10, 1960.

HON. EMANUEL CELLER,
Chairman, Committee on the Judiciary, House of Representatives.

DEAR MR. CHAIRMAN: Further reference is made to your letter of September 2, 1959, requesting a report on H.R. 5448, 86th Congress, 1st session, "A bill to amend chapter 27 of title 35 of the United States Code with respect to the rights of the United States in certain patents."

Section 1 of the bill would amend title 35 of the United States Code relating to "Patents" so as to add to chapter 27, entitled "Government Interests in Patents," a new section 268 consisting of two subsections covering the "Rights of United States in Certain Patents." Subsection (a) would reserve to the United States a royalty-free, nonexclusive license to practice or to have practiced on behalf of the United States any invention, improvement, or discovery for which a patent is hereafter granted where such patent is based upon an invention, improvement, or discovery conceived or first actually reduced to practice (1) in the course of performance of a Government research or development contract, or (2) in the course of the performance of any prior experimental, developmental, or research work done upon the understanding that a contract (whether or not a research or development contract) with the United States would be awarded. Subsection (a) would also require that each research and development contract hereafter awarded by the United States shall provide that in the case of any patent subject to the proposed royalty-free license provisions the United States would receive a percentage, determined by negotiation as provided in the contract, of the income from the commercial utilization of the invention, improvement, or discovery patented. Subsection (b) would define the term "research or development contract" as used in the proposed new section to mean "a contract entered into by any of the departments, administrations, or agencies of the United States under which payment is to be made for experimental, developmental, or research work."

Section 2 of the bill would amend the analysis of chapter 27, title 35 of the code, to reflect the addition of the new provisions proposed under section 1.

The purpose of the bill is to establish a uniform policy and method for determining the rights of the Government in inventions, improvements, and discoveries which may be conceived and reduced to practice during the performance of Government research and development contracts with private persons (other than Government employees), industrial enterprises, educational institutions, and other organizations where the costs would be borne largely, if not entirely, by the United States.

At present the patent rights which result from Government research and development contracts are handled in various ways, depending upon legislation governing particular agencies, or established administrative practices. The differences in contracting in this area can be illustrated by the following:

1. The Government has retained the blanket power to determine at its discretion the disposition of all patentable discoveries or inventions which might arise out of the performance of the contract.

2. The Government has asserted title to the inventions subject to a possible waiver of rights in the title back to the contractor.

3. The Government has reserved to itself complete ownership of any patents which might arise out of the performance of the contract, with a license back to the contractor.

4. The right to obtain and retain title to such patents has been left with the contractor with a reservation in the Government to receive a royalty-free license.

5. The ownership of such patents has been left with the contractor with a reservation in the Government to receive in addition to a royalty-free license the power to require the licensing of others.

6. The Government has obtained title to the patent and permits free use thereof with or without issuance of a revocable license.

The fourth method apparently would be adopted under the proposed bill with an additional requirement that each research or development contract must include provisions for Government participation in the income or royalities that might be realized from the contractor's disposition and commercial utilization of the patents.

The policies and practices of the Government in the field of patent rights under Government contracts have received a great deal of study over a period of years. In 1947, the then Attorney General issued a report that urged full Government ownership of all patents resulting from Government research and development contracts. According to a recent statement of the Assistant Attorney General, Antitrust Division, before the Monopoly Subcommittee of the Senate Select Committee on Small Business, that report, in summary, urged this policy, with few exceptions, as being in the public interest to assure free availability of the technology to all American industry, not just the immediate contractor; to avoid undue concentration of patents in the hands of a few large corporations; and to prevent possible suppression of the inventions paid for by the public. The recommendations of the Attorney General in 1947 apparently caused considerable question to be raised, both in and out of the Government. In November 1956, a report of the Attorney General under the Defense Production Act considered the recommendations of the prior Attorney General and the opposing views.

The 1956 report attempted factual analysis of the problem as the prerequisite of fair solution. It noted, however, that the complexity and volume of the Government's research needs and the urgency of much defense-related research, made analysis extremely difficult. It noted lack of data adequate to indicate the full scope of the problem, particularly with respect to industry's reaction to the differing policies of the important research agencies. It concluded that further careful study of the economic and defense questions presented by the agencies directly responsible, was warranted to elicit, if possible, the needed data.

After the 1956 report was issued the agencies directly concerned formed a study group under the Interagency Task Force for Review of Government Procurement Policies and Procedures. The study group explored many facets of the problem but none of the approaches used resolved the basic complexities of the matter or seemed to afford a means of achieving adequate basis for a solution. At this point, the group recommended a pilot study by the George Washington University to recommend basic techniques for solution of the problem. It is our understanding that this study has not been completed.

Congress itself has considered the question. For example, the Atomic Energy Act of 1954 and the National Aeronautics and Space Act of 1958 both generally provide for title to inventions discovered by a contractor to be retained by the Government, rather than the contractor. The Subcommittee on Patents and Trademarks of the Senate Judiciary Commission has issued two reports (S. Rept. No. 1430, 85th Cong., and S. Rept. No. 97, 86th Cong.). Currently, the matter is being considered by the House Committee on Science and Astronautics which has under consideration a bill to amend the patent provisions of the NASA Act of 1958 so as to provide discretionary authority concerning the disposition of patent rights in inventions conceived or first reduced to practice under NASA experimental, developmental, and research contracts. Also, the Monopoly Subcommittee of the Senate Select Committee on Small Business has held recent hearings on the subject.

It seems quite evident from the reports on the studies made thus far that there are many divergent views on the subject. The basic problem is whether the Government should take title to patents developed by private concerns under

research and development contracts; or whether, in the light of present-day circumstances, the Government's interests may be sufficiently protected by retaining a royalty-free license covering all governmental uses. The former is basic policy under the Atomic Energy Act of 1954 and the National Aeronautics and Space Act of 1958. The latter has been the prevailing practice in the administration of research and development contracts entered into by the military agencies.

Despite the divergent views on the subject, we believe there can be little disagreement as to the need for uniformity where contracts are being performed in the same or similar research and development areas. For example, the Department of Defense and the National Aeronautics and Space Agency sometimes contract with the same contractor on similar types of research and development work, but with entirely different contract provisions on patent rights. Under the Defense contract the contractor obtains the patent and the Government receives a royalty-free, nonexclusive license to practice or have practiced any inventions conceived in the course of the work. Under the NASA contract all inventions become the property of the Government unless the Administrator determines that the public interest is better served by a waiver of the rights.

As illustrative of the position of the Government, an examination made by us of the operations of a major defense contractor disclosed that 218 invention disclosures arose from work financed under Government contracts. Of these, 62 patent applications had been filed, 33 applications were approved for filing, 57 disclosures were under evaluation, 3 were awaiting evaluation, and the remaining 62 disclosures were in an inactive status. Two disclosures were combined in a single patent application. Most of these disclosures for which patent applications were filed or approved for filing were classified by the contractor as having commercial value. The circumstances that the work was sponsored and financed by the Government and performed for the express purpose of accomplishing research and development in the particular field seem to afford persuasive reasons for urging that, in addition to the right to the free use of any inventions, improvements, or discoveries resulting therefrom, the Government should retain the property rights thereto, including any patents that might be granted therefor. Cf. *United States* v. *Houghton* (D.C., Md., 1927, 20 F. 2d 434 affirmed by the Fourth Circuit Court of Appeals, 1928, 23 F. 2d 386), holding that where an employee of the Public Health Service made a discovery or invention while employed to conduct experiments for the purpose of making it, his invention was the property of his employer, the United States; and *Ordnance Engineering Corp.* v. *U.S.* ((1929), 68 C. Cls. 301, cert. denied 302 U.S. 708), where the court was of the view that a Government contractor may occupy the same position as a Government employee with respect to rights in an invention made at the Government's direction and expense. We recognize, however, that persuasive reasons, particularly incentive on the part of the contractor, can be advanced for allowing the contractor patent rights to inventions, improvements, or discoveries made during the performance of a research and development contract with the Government.

In considering the provisions proposed by the bill a number of significant differences may be noted between its provisions and those of comparatively recent enactments dealing with specific Government agencies—for example, the National Aeronautics and Space Act of 1958 (42 U.S.C. 2457), Atomic Energy Act of 1954 (42 U.S.C. 2181–2190), and the National Science Foundation Act of 1950 (42 U.S.C. 1871). These differences seem to indicate that the provisions proposed by the bill need clarification so as to minimize the possibility of conflicting interpretations, some of which may be illustrated, as follows:

1. The laws governing patent rights under certain AEC and NASA contracts provide basically that inventions shall become the property of the United States, except that the rights of the United States may be waived under proper conditions. H.R. 5448 states only that the United States shall have a royalty-free, nonexclusive license to practice or have practiced such inventions, improvement, or discovery.

2. The language in H.R. 5448, which describes the circumstances under which the United States shall have an interest in an invention differs from corresponding language in existing law.

3. A provision of the National Aeronautics and Space Act of 1958 stated: "Each such waiver made with respect to any invention shall be subject to the reservation by the Administrator of an irrevocable, nonexclusive, nontransferrable, royalty-free license for the practice of such invention throughout the world or

by or on behalf of the United States or any foreign government pursuant to any treaty or agreement with the United States." The language of H.R. 5448 does not provide the United States the right to assign royalty-free use of an invention to a foreign government pursuant to treaty.

The following general considerations are submitted with respect to the specific provisions of the bill:

1. The relationships between the provisions of the bill and those of existing statutes relating to specific agencies should be set out.

2. H.R. 5448 contains a provision that "each research or development contract hereafter awarded by the United States shall provide that in the case of any patent covered by the preceding sentence, the United States shall receive a percentage, determined by negotiation as provided in the contract, of the income from the commercial utilization of the invention, improvement, or discovery patented." Some situations might be encountered where it would be impractical to determine or make a reasonable estimate of the income, gross or not, derived from commercial utilization. An example would be where the invention conceived under a research and development contract is used by the contractor as an integral part of the production of his commercial products. It might also be impractical to determine on a reasonable basis what part of the income could be attributed to the conception of a given device as opposed to its engineering development.

3. The income provisions of the bill would be made applicable only to contracts "hereafter awarded." Contracts for service and use of facilities for research and development may be in force for many years, subject to the availability of appropriations. It appears that where long-term contracts are already in existence, the contractors involved would be in a preferential position. It might, therefore, be appropriate to amend the language to cover these situations.

4. The bill does not include provisions for application to subcontracts, and clarification of this aspect seems desirable.

5. The proposed new subsection 35 U.S.C. 268(a) apparently would apply only to research and development contracts or the performance of any prior experimental, developmental, or research work done upon the understanding that a contract (whether or not a research and development contract) would be awarded. It would not seem to include a contract not considered to be primarily a research and development contract but which would have as one of its puropses experimental, research, or development work, except in a case of performance of prior experimental, developmental, or research work done upon an understanding that a contract would be awarded. An appropriate amendment to clearly establish the intent is suggested.

6. Consideration might be given to the inclusion of a provision in the bill similar to 42 U.S.C. 2182 to provide full disclosure of any invention, improvement, or discovery conceived or actually reduced to practice in the performance of any research and development contract, et cetera.

7. Provisions with respect to the effect of an omission of the contract terms specified would seem desirable as an enforcement aid and to fix the validity of contracts not in conformance with the requirements.

8. The proposed requirements relating to the inclusion of specific provisions in Government contracts might be appropriately included under title 41, United States Code, dealing expressly with public contracts.

It is apparent there is a need for the establishment by Congress of basic policies for the determination of patent rights derived from Government research and development programs. Whether the policies should provide for retention by the Government of patent rights, or for the granting of those rights to contractors with royalty-free licenses for Government use in the manner provided by H.R. 5448, is a matter which is for determination by the Congress. However, we are of the opinion that thorough consideration of all the various aspects and divergent views concerning this matter is warranted before legislation is enacted establishing a general policy of retaining royalty-free licenses with waiver of such property rights as it might have or acquire in patents arising out of the prosecution of its many extensive research and development projects, as proposed by the bill.

It is suggested that, in lieu of establishing one uniform policy governing patent rights under research and development contracts, consideration might be given to legislation which would give recognition to the functions and problems peculiar to the activities of individual agencies, as well as the differences in the types of research and development being contracted for by the Government. Such legislation might appropriately set forth broad general policies, including basic

principles, guidelines, and criteria, permitting a measure of flexibility in administration where circumstances so dictate, and might embrace some features of the present administrative practices and methods. We believe such legislation could give full regard to all considerations designed to serve and protect the national interest, the Government, and contractors. Legislation along these lines would facilitate improved methods and practices for administering and carrying out our extensive research and development programs and bring about a degree of standardization in the handling of patent rights, with substantial benefits to all concerned.

Sincerely yours,

JOSEPH CAMPBELL,
Comptroller General of the United States.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION,
OFFICE OF THE ADMINISTRATOR,
Washington, D.C., March 30, 1960.

Mr. CHARLES F. DUCANDER,
Executive Director and Chief Counsel, Committee on Science and Astronautics, House of Representatives, Washington, D.C.

DEAR MR. DUCANDER: Enclosed are copies of recent correspondence between Mr. Loren K. Olson, General Counsel of the Atomic Energy Commission, and myself concerning the meaning to be given the term "aeronautical and space activities" in section 304(b) of the National Aeronautics and Space Act of 1958 if certain pending legislative proposals to amend the act are enacted.

I think it would be helpful if this correspondence were included in the published legislative history of amendments to the act which may be enacted during the current session of the Congress.

Sincerely yours,

JOHN A. JOHNSON,
General Counsel.

FEBRUARY 15, 1960.

Mr. LOREN K. OLSON,
General Counsel, Atomic Energy Commission,
Washington, D.C.

DEAR MR. OLSON: The National Aeronautics and Space Administration has proposed to the 86th Congress a legislative program seeking certain revisions to the National Aeronautics and Space Act of 1958. As a part of these revisions, it is proposed that the definitions of "aeronautical and space activities" and "aeronautical and space vehicles" in section 103 be deleted. However, the term "aeronautical and space activities" is proposed to be retained in subsection 304(b), one of the provisions captioned "security," and it is not intended that its present meaning in that section be modified by repeal of the definitions.

I should like to have an understanding with you that, if the Congress repeals the definitions in section 103, and retains the use of the term "aeronautical and space activities" in subsection 304(b) as intended, then, on behalf of our respective agencies, we will regard this particular use of the term as unchanged in its application to security procedures.

I would appreciate your concurrence in this matter to the end that the present relationships concerning restricted data between the Commission and this agency may not be disturbed, unless expressly modified by the legislative process.

Sincerely yours,

JOHN A. JOHNSON,
General Counsel.

U.S. ATOMIC ENERGY COMMISSION,
Washington, D.C., March 25, 1960.

Mr. JOHN A. JOHNSON,
General Counsel,
National Aeronautics and Space Administration,
Washington, D.C.

DEAR MR. JOHNSON: In your letter of February 15, 1960, you stated that the National Aeronautics and Space Administration is seeking certain revisions to the National Aeronautics and Space Act of 1958, including deletion of the

definition of "aeronautical and space activities" from section 103. However, this phrase would be retained in subsection 304(b), and it is NASA's intention that repeal of the definition would not modify the present meaning of the phrase as it is used in that subsection.

You have suggested we agree, on behalf of our respective agencies, that if Congress should adopt this particular proposal, we will regard use of the phrase "aeronautical and space activities" in 304(b) as unchanged in its application to security procedures.

On the assumption that congressional action on your legislative program will not require a different interpretation of this phrase, I agree to your suggestion.

In this connection I might recommend that Congress be furnished a copy of your letter and this reply so that our understanding in this matter may become a part of the legislative history.

Sincerely yours,

———— ————, *General Counsel.*

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION,
Washingon, D.C., March 30, 1960.

Mr. LOREN K. OLSON,
General Counsel, U.S. Atomic Energy Commission,
Washington, D.C.

DEAR MR. OLSON: Thank you for your letter of March 25, 1960, agreeing that, if Congress should adopt certain pending legislative proposals for amendment of the National Aeronautics and Space Act of 1958, we will regard use of the phrase, "aeronautical and space activities," in section 304(b) of the act as unchanged in its application to security procedures. I understand that your agreement is based on the assumption that congressional action on the pending legislative proposals will not require a different interpretation of this phrase.

In accordance with your suggestion, I am transmitting copies of our correspondence to the Committee on Science and Astronautics of the House of Representatives and the Committee on Aeronautical and Space Sciences of the Senate.

Sincerely yours,

(Signed) JOHN A. JOHNSON,
General Counsel.

ILLINOIS MANUFACTURERS' ASSOCIATION,
Chicago, March 23, 1960.

Re Patents rights.

Hon. OVERTON BROOKS,
Chairman House Science and Astronautics Committee, House Office Building,
Washington, D.C.

DEAR CONGRESSMAN: Our association, now in its 67th year, is comprised of several thousand Illinois manufacturers, whose combined output accounts for practically 95 percent of the industrial production of Illinois.

Being manufacturers, the members are keenly interested in the subject of patents rights. Our patents and trademarks committee has carefully analyzed the proposals now in the House with respect to legislation relating to patents rights under Government contracts. This IMA committee presented a recommendation of policy to the IMA board of directors at its meeting on March 11 (copy enclosed). The directors unanimously approved this statement, after discussing the subject at some length.

We take the liberty of calling this to your attention in the hope that the subject matter will receive your favorable consideration and that of other members of the House now considering this very important subject.

Respectfully yours,

E. EDGERTON HART, *Secretary.*

STATEMENT BY ILLINOIS MANUFACTURERS' ASSOCIATION PATENTS AND TRADEMARKS COMMITTEE, RE PATENT RIGHTS UNDER GOVERNMENT CONTRACTS

In view of current consideration by Congress of legislation concerning the subject of patent rights under Government contracts, the patent and trademarks committee of Illinois Manufacturers' Association has made a study of the situation as now existing and as affected by proposed legislation. That study has

included a review of studies made by other organizations and a consideration of the experiences and attitudes of our members.

At the outset, your committee reaffirms the policy of IMA as frequently expressed in the past that the American patent system has provided and will continue to provide incentives for technological developments which contribute greatly to higher standards of living and leadership in scientific attainments. Under our private enterprise system of economy, those incentives lead to the creation of new business ventures and investments necessary to assure the development and growth thereof. While it is recognized that any system may be improved, it is our sincere belief that improvements should be effected in the light of great care to assure that American inventors are not deprived of those important incentives to invent, develop, and disclose which are provided by the existing patent laws that have succeeded admirably in promoting "the progress of science and useful arts" within the framework of our Constitution.

Bearing in mind the foregoing principles, it is the opinion of your committee that:

(1) The time-tried and practicable requirements of the Department of Defense whereby the Government reserves a royalty-free, nonexclusive license to practice or have practiced for it inventions first conceived or reduced to practice under its research or developments contracts whereby the contractor retains title to such inventions, represent a fair and equitable solution to the problem. Under this method of safeguarding Government requirements, there is assured a desired broader base of interest in Government research and development contracts with resulting enhanced technological progress and ultimate economies in securing the desired results.

(2) That consistent with proper security safeguards, the Atomic Energy Act of 1946 (as revised in 1954) and the National Aeronautics and Space Act of 1958, which, as a minimum, require acquisition by the Government of inventions and discoveries made (*a*) where a "relationship" with atomic energy exists or (*b*) when certain "determinations" are made by the Administrator of the Space Agency in respect of inventions made in the performance of a contract, should be amended to limit the rights of the Government in such inventions to a royalty-free, nonexclusive license in general consonance with the Department of Defense requirements.

(3) That consideration of these matters of patent rights under Government contracts be limited to the subject at hand and not used as a vehicle for "back-door" amendments to our basic patent laws.

Your committee recommends that a copy of this statement be transmitted by this association to Members of Congress from the State of Illinois and to members of those committees of Congress which may have under consideration legislation affecting the foregoing matters.

March 11, 1960.

53283—60——33

TO AMEND THE NATIONAL AERONAUTICS AND SPACE ACT OF 1958

MONDAY, APRIL 4, 1960

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND ASTRONAUTICS,
Washington, D.C.

The committee met at 10 a.m., Hon. Overton Brooks (chairman of the committee) presiding.

The CHAIRMAN. The committee will come to order.

We met this morning at 9:30 unofficially in order to see an exact replica of this new satellite which is encircling the globe. I want to say that we appreciate the fine cooperation of NASA in sending this machine down to our committee room for the time being so that the members of the committee can see the exact machine that is presently in orbit. This should help all of us understand what is going on, in a small way. We are grateful to Dr. Glennan.

I also want to say publicly: I was on hand the other night—at 2 a.m. in the morning—when the first data came in from Pioneer V 1 million miles out in space. That data was recorded in longhand as it came in from 1 million miles out. I have asked Dr. Glennan if he would have copies of that data sheet duplicated so that every member of the committee might have a copy of the data sheet, so we could frame a copy and place that copy on the walls of this committee room. I think this picture here ought to be framed, too.

Dr. GLENNAN. Mr. Chairman, those pictures will be here tomorrow.

The CHAIRMAN. Fine. We want to thank Dr. Glennan for his cooperation. This is history, I know everybody realizes that. I think Dr. Glennan is to be complimented, along with his organization, NASA, and every member of it, for getting the first weather satellite as well as Pioneer V up in orbit. They have been truly great achievements, and we are very proud of what NASA has done.

Now coming down to earth again——

Dr. GLENNAN. Mr. Chairman, could I interrupt, please?

The CHAIRMAN. Sure.

Dr. GLENNAN. Believing that the committee would be interested in seeing that these aren't just pictures that we take to go into the Sunday supplements, we asked Dr. Wexler of the Weather Bureau and Bill Stroud of our own organization if they wouldn't bring up an actual weather map of the area that was covered by these pictures which you have in front of you and show you these clouds on the weather map as well as the clouds on the picture. Could we ask them to just stretch this out in front of you here where you could see it?

The CHAIRMAN. Why wouldn't it be a very good thing to do that first?

Dr. GLENNAN. Yes. I had hoped you would allow me to do that.

The CHAIRMAN. Before we get to that, I want to read a memorandum that I have here. I want to see whether or not the committee will endorse it. In order that there be no misunderstanding in the future, only Members of the Congress, committee members, and staff members will hereafter be permitted to occupy the chairs of members during committee hearings, subject to the discretion of the Chair. That would allow members of the press or television men for example to attend, and if there are no vacant chairs in the room other than vacant chairs of committee members, to occupy them, at the discretion of the chairman. Only members of the committee, visiting Members of Congress and members of the committee's staff, when recognized by the chairman, will be permitted to ask questions of witnesses during committee hearings.

Now is there any objection to those rules being adopted by the committee?

(No response.)

The CHAIRMAN. I think they are reasonable and sensible, and if there is no objection, it is so ordered.

Now, Dr. Glennan, if you will proceed with your statement.

Dr. GLENNAN. Yes.

The CHAIRMAN. He has given his name and background to the reporter.

Dr. GLENNAN. Dr. Wexler will do that. I am sorry to stage manage this for you, sir, but if the committee members could go back there I think they could see rather easily what it is we are talking about. If you will hold it up so they can see it.

STATEMENT OF DR. HARRY WEXLER, DIRECTOR OF RESEARCH, U.S. WEATHER BUREAU

Dr. WEXLER. I am Harry Wexler, Director of Research of the Weather Bureau, and here is Mr. Stroud of NASA. We have a weather map which is very close to the time at which these pictures, which were released by the President at 5 p.m. Friday, were taken. I would like to point out the very close association that the cloud pictures, which are the white areas on the photograph, have to the gray areas on the weather map which represent the clouds also. These cloud areas were drawn independently of the cloud pictures, and there is rather remarkable substantiation.

This fourth picture especially, which shows very clearly the Gulf of St. Lawrence and part of the St. Lawrence River, including the Island of Anticosty, which is right over here [indicating]. It shows up on this picture as a dotted area, surrounded by a very bright cloud to the south and mixture of dark and white to the north, which is probably some snow and not very much cloud. Then as you look west, as the satellite was looking when it took the picture, there is an enormous white area extending to the horizon, which is probably 1,800 miles away from the satellite. It showed the extensive cloud area associated with this storm off the New England coast, which gave Washington rain on Wednesday night, I believe it was, and New York, New England on Thursday afternoon, Thursday night, and Friday morning.

Connecting this cloud with the coastal storm is a sort of a cloud bridge, which shows a narrowing, just as we would expect it from the weather map, and then a broadening, just at the horizon as we approach the very large cloud area associated with that very large midwestern storm which dumped a lot of snow and rain in the flooded areas of Nebraska and neighboring States.

This shows up extemely clearly on the map and on the photos, and reinforces our belief as meteorologists that having information from clouds alone, as taken by this satellite, particularly over regions of the oceans, polar regions, and deserts, where we don't have normally observations, we can probably make some rough weather map without any other information for these areas. Of course, it cannot give us the detailed information that our numerous weather stations give, balloons, temperatures, humidity, but for those larger areas of the Earth's surface where we have no information, the cloud cover will be extremely valuable to meteorologists in filling these maps.

We hope as time goes on that a system of meteorological satellites, polar satellies, can get the whole world cloud cover well enough to continuously follow any major cloud system, so that we would not lose track of any major storm anywhere on the face of the Earth.

The CHAIRMAN. Do you think by those pictures we will be able to tell farmers when to plant their cotton, and when not to plant?

Dr. WEXLER. I doubt if we can tell that from the satellite information. But it will add to our knowledge even over the central part of the United States, where we have reasonably good coverage now.

I think the ability to see from above, somewhat similar to a bird's-eye view, a cloud picture may reveal unsuspected aspects of storms, their structure, their movement, and their development and dissipation that we just have not been able to arrive at because of lack of just this overall comprehensive bird's-eye view.

Mr. KING. Question: These sharp lines that you see——

The CHAIRMAN. We will have to stop taking photographs as long as we are in session, gentlemen. We understand the photographer of the Republican National Committee is coming over, and I have agreed to suspend for him. [Laughter.]

Wait until we finish with this presentation and we will be glad to suspend. Then the photographs may be taken.

Mr. MCDONOUGH. One more, Mr. Chairman. This will take care of it, if you will just suspend for a moment.

The CHAIRMAN. All right. The committee will recess for 3 minutes.

(Recess.)

The CHAIRMAN. Now, will you proceed, sir.

Dr. WEXLER. This is all I had to say, sir. I will be very glad to answer any questions.

The CHAIRMAN. The only question I had was whether or not you would be able to help our cotton planters.

Any other questions?

(No response.)

The CHAIRMAN. If not, that is it, Doctor? Thank you. We appreciate your coming, sir. It was a very fine presentation.

Dr. WEXLER. Thank you, sir.

The CHAIRMAN. Doctor, before we begin I want to say that I may have to slip away for a few minutes to an Appropriations Subcom-

mittee meeting. I promised a delegation that I would attend. In my absence I would like Mr. Sisk to preside. I will be right back as soon as I can make it.

Dr. GLENNAN. Thank you, sir.

The CHAIRMAN. I want to say one thing more. Because of the fact that it is getting a little late in the session, and also because of the fact that so many members have other things that they must attend to, I am going to set up a subcommittee for the purpose of investigating a number of smaller matters the committee has to look into. In making appointments, I will be governed by who will be available to serve during that time.

For instance, Mr. Miller is going to Geneva, Mr. Van Pelt is going to Geneva, some of the others—well, there is no use in going through it; some have troubles at home that they are looking into, if you know what I mean. [Laughter.]

With that in mind I will announce the membership of the subcommittee in the next day or two.

Now, Dr. Glennan, if you will proceed, sir, we will be glad to hear your statement. You are familiar with the statements that have been made in reference to the bill that we have been considering. This morning we would like to hear from you in open session as to what you think about the suggestions made, where you can meet them, where you differ with them, and so forth. Following that, the committee will go into executive session and consider this measure. If you will be good enough to consent to it, we may wish to call you into executive session and confer with you on a number of matters that may come up.

Dr. GLENNAN. That we would be happy to do.

STATEMENT OF DR. T. KEITH GLENNAN, ADMINISTRATOR, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION; ACCOMPANIED BY DR. HUGH DRYDEN, DEPUTY ADMINISTRATOR; JOHN JOHNSON, GENERAL COUNSEL, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Dr. GLENNAN. Mr. Chairman, gentlemen, I appreciate this opportunity to appear again before you and to discuss further the proposed amendments to the statute which is our national charter for space exploration—the National Aeronautics and Space Act of 1958. The bill before us is H.R. 9675. The record on it, which has been made during these hearings, is excellent. As your last witness and as one whose whole job is concerned with the administration of this act, I want to be as candid and as helpful as I can in dealing with the issues.

Two things should be noted at the outset:

First, by way of background, the subject matter with which you and I deal is dynamic, fast moving, and vital to this Nation. We are concerned with getting ahead. We are concerned also with setting the right pace. In other words, we must run but not stumble. The very nature of our task demands coordination, cooperation, and decision. I think we can all agree on the importance of these objectives. To achieve them, we must not obscure the clear perception of our responsibilities, nor complicate the governmental structure within

which we operate, nor divert our efforts from fulfilling our primary mission.

Second, NASA was created 20 months ago by enactment of the National Aeronautics and Space Act of 1958. It was the product of a startled and somewhat anxious Nation. Wisely, it created an agency with broad powers to develop and carry out a civilian program of aeronautical and space activities which would meet the needs of the Nation. Cautiously, it erected an elaborate structure so that the machinery of government would be adequate and the attention of the highest authorities in the executive branch would be focused on space. I need not specify the many provisions of the act which were intended to accomplish these objectives. I think we can all agree that the act, as an initial effort, was a first-rate piece of legislation. But now, after these 20 months, all of us have learned from experience. It is appropriate, therefore, that we apply our experience to improving the act under which we live. This we have done, and H.R. 9675 is the result.

In the President's own words, he recommends that the act be amended—

> to clarify management responsibilities and to streamline organizational arrangements concerning the national program of space exploration.

Specifically, the clarification of responsibility proposed in H.R. 4675 affects subsections 102 (b) and (c) under the title, "Declaration of Policy and Purpose," subsection 203(a) under the title, "Functions of the Administration," and a new section 309 entitled "Coordination and Cooperation." The proposed streamlining of organization affects section 201, entitled the "National Aeronautics and Space Council," and section 204, entitled the "Civilian-Military Liaison Committee."

My purpose today is to consider with you, in the light of NASA's day-to-day experience during the past year and a half, the issues raised and some of the legislative suggestions made in the course of these hearings.

The first fundamental issue is whether there should be one or two governmental programs involving activities in space. There is no questioning the fact that today we have two organizations deeply engaged in such activities. The President, referring to the existing law, stated that the concept of a "single program embracing military as well as nonmilitary activities" should be eliminated. He said further:

> In actual practice, a single civilian-military program does not exist and is, in fact, unattainable; and the statutory concept of such a program has caused confusion.

As I see it, the President is seeking to make the statutory concepts fit the hard facts of life.

It has been argued that a single national program for space, embracing both military and nonmilitary applications, is not only attainable but also desirable. I have examined those arguments very closely, and I believe that basically they involve a failure to comprehend the variety, diversity, and breadth of potential human activity in this new realm. I believe that such views stem from a preoccupation with the areas of common technology involved in the military utilization of space and the civilian exploration of space for peaceful purposes. Further, legitimate concern with the possibility of dupli-

cation raises the specters of waste and inefficiency which are assumed to follow from the existence of separate and divergent but interrelated space programs. Finally, a single governmental program appears to offer the advantages of comprehensive, all embracing planning and decisionmaking. These are the factors which appear to give rise to the suggestions that the military be given sole responsibility for a national space program or that NASA be reconstituted to conduct all research and development for activities in space, including military applications, possibly after the pattern of the Atomic Energy Act.

Now, I do not deny the desirability—indeed, the enormous importance—of the objectives of avoiding waste and achieving efficiency, nor do I criticize those who would seek the virtues of comprehensiveness in planning and decisionmaking. I do not deny that there are large areas of science and technology which are common to both the military uses and the civilian uses of space. I am in the front ranks with those who seek to identify and to make effective arrangements concerning areas of common interest to NASA, DOD, AEC, and other governmental agencies. I abhor bureaucratic jurisdictional disputations that follow from overlapping or uncoordinated missions. And that mouthful, as Ken Hechler has pointed out, simply means that I don't like redtape.

Nevertheless, it is essential that the civilian mission of space exploration should not be confused with other governmental functions such as the national defense or the development of atomic energy. Although these functions are alike in their dependence upon science, their interest in research, and their need for hardware development, these facts should not cause us to lose sight of the unique mission of NASA.

The departments and agencies of the executive branch are organized along broad functional lines. They each have a mission in life. The Department of Defense is responsible for the military security of the Nation; the Atomic Energy Commission is responsible for the development and exploitation of the new discoveries in nuclear physics. NASA should be just as clearly responsible for carrying out the Nation's space exploration program.

Before turning to the organizational issues, let me make one more point with respect to the importance of an independent civilian space exploration program. In my view, the fundamental wisdom of the National Aeronautics and Space Act of 1958 is enunciated in the very first sentence of the declaration of policy and purpose. I quote:

> The Congress hereby declares that it is the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all mankind.

I am convinced that space exploration is one of the most fruitful areas for agreement between ourselves and our principal international competitor. I foresee the practicality of arriving at mutually beneficial understandings on the peaceful utilization of space. It is essential, I believe, that the basic wisdom of the act be preserved. Merging the civilian with the military uses of space is certainly not the way to do it.

The second fundamental issue is whether the law should prescribe a simple organization or a complex organization for space explora-

tion. The plan fact is, our present overall organization is more complicated than it need be. Many witnesses before this committee, in one way or another, have recognized this fact.

The President states that—

> it is no longer desirable to retain in the act those provisions which impose duties of planning and detailed surveying upon the President—

and he concludes that—

> the National Aeronautics and Space Council should be abolished, since its only function is to advise the President in the performance of those duties.

He recognizes the necessity that, as he says—

> NASA and the Department of Defense advise, consult, and keep each other informed with respect to space activities within their respective jurisdictions—

but he recommends that—

> the act should not prescribe the specific means of doing so.

He affirms that—

> the act should contain safeguards against undesirable duplication * * * in developing the major tools of space exploration—

and while he proposes the elimination of the Civilian-Military Liaison Committee, he also proposes that—

> the act be amended to provide that the President shall assign responsibility for the development of each new launch vehicle, regardless of its intended use, to either NASA or the Department of Defense.

As I see it, the President is seeking to increase the effectiveness of government through a simpler, more flexible organization. I hope also that we will avoid substituting some new organizational complexity in place of an old one.

I am aware that suggestions have been advanced which proclaim for themselves the virtues of simplicity. I am aware that other suggestions are based upon the assumption that the existing complexity of government itself requires an elaborate governmental organization for space exploration.

I have examined these suggestions with an open mind. They appear to me to be inspired by sincere desires to achieve program coordination among the various elements of the executive branch. They earnestly seek to accelerate and improve the workings of the decisionmaking machinery of government. They aim at mutually informed cooperation among agencies and departments in areas of common interest. They are motivated by laudable desires to avoid a vacuum in the administrative organization concerned with space. Thus, coordination, the improvement of decisionmaking, cooperation, and the filling of functional gaps—these are the ends.

Let us look at the suggestions, other than those in H.R. 9675, for achieving these ends.

Operational coordination and accelerated decisionmaking are found by some in the idea of a czar for all of the Nation's space activities. Others would achieve these ends by assigning responsibility for military applications to NASA after the model of the Division of Military Application in the AEC or, possibly, by subordinating NASA to the military. Mutually informed cooperation is found by others in the idea of liaison committees, perhaps after the model of the Military Liaison Committee in the AEC. Others find the avoidance of an ad-

ministrative vacuum in retaining the Space Council and strengthening the Civilian-Military Liaison Committee in some form. These motives and these devices, when reduced to common terms, are all advanced to avoid waste and achieve efficiency—in short, to get effective government for the conduct of space activities. The question is: Will they?

Let us consider for the moment the idea of a space czar. The basic fact relevant to any evaluation of this idea is that only NASA and the Department of Defense have clear management and operational responsibilities in space. Unlike other agencies, such as the AEC, which contributes to the space program, only NASA and DOD actually utilize space; that is, conduct activities in it in accordance with their respective missions. In this situation, the only justification for the creation of a space czar is that someone other than the President is needed to exercise the President's ultimate authority and power of decision over the Secretary of Defense and the Administrator of NASA.

It must be assumed by those who advocate the creation of such an office in the White House that the President cannot, because of his multiple duties, give the Nation's space activities the attention they deserve. I cannot accept this assumption, nor is there any basis for it in the experience of the last year and a half. I have had no difficulty in reaching the President and obtaining decisions.

Let us consider the idea of creating in NASA a Division of Military Application similar to that in the AEC. Atomic energy involves a single technology. The monopoly that is characteristic of the AEC ingredients. In space exploration there is no basic material nor any single technology. The monopoly that is characteristic of the AEC cannot be likened to space. The fact is that NASA is not and never will be engaged in manufacturing hardware for the military departments according to their specifications. The relationship between DOD and the AEC's Division of Military Application is essentially that of user and supplier. This relationship must be differentiated from the relationship between NASA and DOD. In our case, NASA has in the past utilized launch vehicles previously developed by the military. In the future, the military may utilize launch vehicles developed by NASA. Nevertheless, the respective uses are and will be for different purposes. Accordingly, an organizational unit within NASA drawn along the lines of the Division of Military Application of the AEC is not a solution to the problems of coordination, decisionmaking, or cooperation.

Let us consider, too, the idea of liaison committees. The facts of life require liaison in the space business at all levels, formal and informal, involving both technical and administrative officials and covering basic policy, program definition, project selection, and operational detail. It is unrealistic and inefficient to compress such broad relationships into the confines of narrow channels. NASA's relationship to the DOD is not like that of the AEC. This relationship does not primarily involve a flow of requirements and specifications from DOD to NASA in order that NASA may perform functions of primary interest to DOD. The relationship between NASA and DOD does involve the constant reciprocal exchange of information and advice at all levels. It follows that a liaison committee modeled

upon the Military Liaison Committee of the AEC would not be appropriate.

Finally, let us look just briefly at the idea of subordinating the agency charged with the mission of space exploration to military control. I submit that this idea does violence to the basic national policy of utilizing space for peaceful purposes. It must, therefore, be rejected as a solution to the organizational problem.

I should like very much to be able to have each of you travel with me over the course of a major policy or program decision, from proposal to project, from concept to execution, and to observe for yourselves the unquestionable advantages of working within a simple framework connecting the Secretary of Defense and the Administrator of NASA to the President at the top. I cannot overemphasize the importance of a simple triangular structure. But, lest it be thought that the structure proposed in H.R. 9675 is too streamlined, let me say this: All of us recognize the need for cross-fertilization among the sciences, and all of us recognize the need for bringing divergent views to bear upon the formulation of policy. All of us recognize the need to avoid functional gaps. However, one cannot be assured of bringing together the right people at the right time and under the right circumstances by creating, with the finality and formality of a statute, a czar, or a council, or a committee, or a division, which cuts across the functional lines of NASA and DOD, or which is not responsive to their management.

During the past few months, as the tempo of space operations has increased, we have been very conscious at management levels in NASA and DOD of the existence of special areas requiring mutual consideration and joint planning. These areas are clearly identifiable. They include launch vehicles, launch pads, and support of Project Mercury, among others. To date, the means of coordination, cooperation, and decisionmaking in such areas have been on an ad hoc basis. We have, however, now taken affirmative steps to create what might be called an Aerospace Activities Coordinating Board, with the Deputy Administrator of NASA and the Director of Defense Research and Engineering as the permanent cochairmen. These men would be assisted by officials from each agency as may be appropriate for the problem at hand. You may recall that the Deputy Secretary of Defense, Mr. Douglas, when he appeared before this committee, described the advantages of such a Board. The Board will be able to take effective action by virtue of the authority of the two cochairmen.

Gentlemen, I respectfully submit that the present legislative need is the achievement of simplicity of organization and clarification of responsibilities for space activities. I strongly urge that this be accomplished by enactment of H.R. 9675.

Let me close with a single observation which inescapably pervades the whole space business. As one who has been able to observe firsthand the education of the next generation in the U.S.S.R., I have no doubt that they are motivated by a desire to "beat America." All I can say to you is, I am motivated by a desire not to be beaten.

Mr. SISK. Thank you, Dr. Glennan. That is a very able, a very fine statement.

The Chair recognizes the gentleman from West Virginia for any questions.

Mr. HECHLER. Dr. Glennan, I think this is a fine statement. I think it carries us a good deal forward beyond some of our previous considerations. I am particularly proud that you have included the necessity for decision, along with coordination and cooperation. Of these three, wouldn't you say that decision is really the most important?

Dr. GLENNAN. I have noted your insistence on this, and I couldn't agree with you more, Congressman Hechler.

Mr. HECHLER. You make quite a point of the fact that there is variety, diversity, and breadth, as you state on page 4, and with such variety, diversity, and breadth isn't this an additional argument for pulling it all together?

Dr. GLENNAN. If you mean by pulling it—in your question—pulling it all together, pulling the military utilization of space together with the national program in space exploration, I think that I would not be in agreement that these come under a single head.

They really do come together at the Presidential level. I think in the course of the past 18 months the strains that accompanied the birth of NASA and the transfer to NASA of certain of the military-initiated projects have essentially disappeared. Throughout the past 9 months we have been experimenting with a variety of mechanisms which were each developed in an attempt to get at this business of coordination, exchange of information, so that in advance of decision-making the parties concerned could have the facts. I believe we have come down that road so that with two programs, if you will, there is every evidence that the people who have to make the decisions will have the facts to make those decisions, those decisions will be concurred in, if you will, on either side of the Potomac.

I see no problem in this, Congressman Hechler.

Mr. HECHLER. We have had testimony before this committee that the military departments have requirements for satellites which are concerned with navigation, weather, and communications. We have also been told by civilian experts that their requirements are for navigation, weather, and communications satellites. If we have two independent administrators making decisions about the same things, coming to Congress for appropriations for the same things, I find some difficulty as a member trying to ascertain where this will all be pulled together.

Dr. GLENNAN. Mr. Hechler, I think this is not really that complicated. The navigational satellite is presently a responsibility of the Department of Defense, under the immediate management of the Navy Department.

We have people involved in that project team, we know what is going on there. At some point where we see that there is really value to be had from the navigational satellite project, value in the civilian sense; that is, for our merchant marine or for our aircraft, whatever it may be, you may be certain that we will then be dealing with that problem as between the Secretary of Defense and myself in an attempt to bring to the President a proposal for a joint program, or that one or the other agency which then has the major interest in it, would take over the project management.

We are not running a navigational satellite program in NASA. We are constantly aware of what is being done by the Navy. I think in this way we keep ourselves abreast of the progress in that art, and

at a time when it makes sense to do something about it we will then be coming to you to tell you what we want to do about it.

Mr. HECHLER. My central concern in these questions and hearings is trying to establish who above NASA and the military will have the power of decision. And I am trying to protect the power of decision of the most powerful person in the free world: the President of the United States.

Mr. GLENNAN. You know, Mr. Hechler, the great bulk of the decisions made as between NASA and the Defense Department have not had to go to the President. These are matters on which two organizations seem to find means of coming into agreement, where we have to take them to the President this is in the language of the law a deminimum situation. I see no problem in this.

Mr. HECHLER. Have you read the testimony of Roy Johnson, in which he related in considerable detail the failure to arrive at decisions during a critical period in 1958 and 1959? This is what concerns me deeply as a Member of Congress. Also the testimony of General Medaris. In fact, the testimony of those who have left the Government seems to be to the effect that the decisionmaking power has been lacking, and that is what concerns me. I ask these questions not in a critical vein.

Dr. GLENNAN. I understand.

Mr. HECHLER. But to try to establish a record.

Dr. GLENNAN. It is a somewhat embarrassing position to be in, if you don't mind my saying it, to comment on the testimony of people who have operated in this area and find themselves at differences with those of us who have stayed to try to carry out the program.

I am very sure that there are times when I am discouraged about this, but I have found somehow a way to get the answer, one that I can live with, one that I think makes sense for the Nation, and when I am asked to comment on the testimony of Mr. Roy Johnson on matters of this kind I can only say that the organization which he headed no longer has that responsibility, and there may have been a reason.

Mr. HECHLER. I meant my questions in a constructive vein to try to establish and to protect the power of the President. Now, you mention here——

Dr. GLENNAN. But, Mr. Hechler, I think in making the question you tend to, in attempting to build this record—and I know that you are simply trying to fill out the record so that we all understand the situation—I recognize that you are not attacking the fact that we haven't done this or done that.

Mr. HECHLER. Not at all.

Dr. GLENNAN. But in asking the question you give validity to a criticism made by Mr. Johnson which may not be valid, in my opinion.

Mr. HECHLER. All I can say is, if we in Congress had known what Mr. Johnson testified the other day, and what General Medaris had testified, had we known it at the time, we in Congress and on this committee certainly would have taken considerable effort to try to see that these decisions were resolved, that the American people knew the necessity for making decisions on matters that appear to be slowed down, or kicked around between departments.

Dr. GLENNAN. I really don't think they were slowed down that much. Dr. Dryden is anxious to make a comment here.

Dr. DRYDEN. Without identifying any particular situation in the past, I think that decisions were made at higher levels, but that the people at lower levels did not like these decisions; some of us now with hindsight feel that some of the decisions may have been wrong, but I do not believe there was an absence of decision.

I think the trouble was that the decisions were not those corresponding to the wishes of those who asked for them.

Mr. SISK. Is the gentleman about finished?

Mr. HECHLER. About finished.

Mr. SISK. We will give you one more question.

Mr. HECHLER. A very simple one. On your last sentence, I wonder if you care to put this on a positive rather than negative note; instead of saying "I am motivated by a desire not to be beaten," saying we are motivated by a desire to win.

Dr. GLENNAN. Yes, absolutely.

Mr. SISK. Is the gentleman finished?

The Chair recognizes the gentleman from Pennsylvania.

Mr. FULTON. I want to thank Dr. Glennan and Dr. Dryden, on the work that you have been doing. I also want to compliment Dr. Glennan on the excellent statement he has submitted today.

I think that Pioneer V and Tiros are outstanding accomplishments in science. They are clearly firsts. At this time there is no doubt in my mind that we are much ahead of the Russians in space. We have been able to perfect instruments that they will be years in trying to develop.

The point that amazes me is that just because the Russians have been unable to solve the smaller nuclear warhead package, they have had to have larger boosters, while we have been able to solve that problem and get smaller boosters, at less expense, and now because we have been able to do that, the Russians are complimented on the fact they have the big boosters. It is a lack of the breadth of the Russian program that has caused them to limit themselves to the big boosters and has caused them not to venture into the fields on a broad base in space, as the United States has done.

So again I want to compliment everybody at NASA, including Dr. Glennan and Dr. Dryden.

I believe that your statement convinces me that we should keep the legislation simple, and that the President is right when he says that we should not enact statutory provisions as a method of working out the various differences there might be between NASA and the Department of Defense.

I notice particularly by your statement, Dr. Glennan, that you have said, on page 8—

> that the act be amended to provide that the President shall assign responsibility for the development of each new launch vehicle, regardless of its intended use to either NASA or the Department of Defense.

The President has recommended that, and you have cited that with approval. To me, I believe that is a good procedure, and it gives us the method of carrying out these programs at the highest level. I would disagree with the gentleman from West Virginia in making the space program entirely under one agency, because I believe that there is a special field for NASA in the civilian exploration of space—that means in all its scientific aspects.

Likewise, I disagree in the proposed method of putting a person between the President and one of his Cabinet members, the Secretary of Defense, and between the President and one of the major agencies, NASA, headed by Dr. Glennan.

Might I ask this: You are satisfied with the progress of your organization, both as to the scientific developments at NASA and likewise as to its organizational methods and setup to date, are you not?

Dr. GLENNAN. Mr. Fulton, I don't want to give the impression that I am ever satisfied with this sort of thing.

Mr. FULTON. No, but I want you to speak clearly.

Dr. GLENNAN. To speak clearly, I am satisfied that we have made very, very real progress, and it has been sound progress. I think we have moved definitely forward and are going toward a goal with assurance.

Mr. FULTON. And you can tell the American people—and I would like Dr. Dryden to say this, too—that in your experience with the NASA, you are not burdened down with redtape, nor lack of decision, nor disputes that are holding back the U.S. space and scientific programs in this field?

I would like a definite statement on that, because I think it should be made not as a matter of your saying you are selling your own wares, but rather to justify your very existence.

Dr. GLENNAN. I think we are not being delayed by any lack of decisionmaking.

Mr. FULTON. You therefore deny that there are such defects in the NASA organization and NASA procedures?

Dr. GLENNAN. I think that is right.

Mr. FULTON. Dr. Dryden, with your great experience with NACA, as well as NASA, what do you say?

Dr. DRYDEN. I would join in the statement that we are not being held back by any circumstances that I know of. We have received cooperation from many agencies of Government.

Mr. FULTON. You aren't bogged down by redtape nor lack of decision?

Mr. DRYDEN. No.

Mr. FULTON. Say it for the record?

Dr. DRYDEN. We are not bogged down by redtape or lack of decision, Mr. Fulton.

Mr. FULTON. Thank you. [Laughter.]

May I say this: You see, these are very serious charges that go to the security of the United States, and likewise to your operation, and they cannot be laughed off.

Dr. GLENNAN. That is correct.

Mr. FULTON. The time for laughing off the charges has long since passed. If it becomes a matter of humor, I myself will begin to worry about NASA. If it isn't a matter of humor, you had better state so very affirmatively and directly, because I am one of the taxpayers, too, and I don't want my money wasted.

Dr. GLENNAN. Mr. Fulton, I think that what is presently proposed in the law——

Mr. FULTON. That is all, Mr. Chairman.

Dr. GLENNAN (continuing): Arises out of our determination to eliminate as much redtape as we can. There is always some. I

think, by and large, we are operating today very much as we would propose to be operating were the law to be changed. I think all of these things say that our experience over 18 months has convinced us that the proposed amendments validate an operating condition with which we can live and which effectively will let us go forward.

Mr. HECHLER. Will the gentleman yield at that point?

Mr. FULTON. I will be glad to.

Mr. HECHLER. You really don't need the law if you are already operating this way today; is that correct?

Dr. GLENNAN. That is correct.

If you do not support the change—the amendments proposed, we will then be required to continue to hold meetings of the Space Council, to give house room to and utilize to the extent that it makes sense to the Civilian Military Liaison Committee. We will have these impediments to progress.

Mr. HECHLER. I understand.

Dr. GLENNAN. Which I would like to see removed.

Mr. FULTON. I am sorry to leave, but I am called to report out a bill.

The CHAIRMAN. Mr. King?

Mr. KING. Dr. Glennan, I would like to congratulate you on a very clear and straightforward expression of your position. I am one of those that will have to pass judgment on this proposed legislation. I am wondering if you could help me get a bird's-eye view of this proposed bill, much the same as I have an excellent bird's-eye view of a good portion of the Earth's surface right here before me. Could you perhaps recapitulate now and—let me explore that just a little further before you answer.

In this bill there are some proposals that are not particularly controversial, they are more or less technical or mechanical in nature, and I think you can tell pretty well ahead of time that they are not likely to run into serious obstruction; it is just a matter of our being informed so that we can explain clearly to the body of the House of Representatives.

On the other hand, there are proposals which obviously involve ideological and philosophical differences, perhaps, and I think you know pretty well what those are. Could you perhaps, in a few words, and—maybe it is impossible, but if you will do the best than you can—summarize the essential features of the bill, dividing those that are purely technical and mechanical and noncontroversial, on the one hand, and those in which there are basic philosophical differences.

Dr. GLENNAN. I think the very simplicity of the structure we are proposing allows me to do this in a few words. The concept that we seek to have validated in law is that the Nation's space exploration program shall be one designed to enhance the peaceful purposes of the Nation, that the information coming from that program will go for the benefit of all mankind.

We believe that that program is a program in the best sense of that word, a broadly based, well planned, urgently prosecuted program designed to gain for us the long-range benefits that we believe will come from space exploration, new knowledge, new applications, perhaps a very much better mechanism for international cooperation than any we have thus far achieved.

We believe that the military will have some uses for outer space, that these uses are indeed uses which probably compete with alternative methods of achieving the same military end objective, but that they may be better, they may be more easily achieved, they may be less expensive than the present ways of doing it.

We believe, therefore, that the military must consider and continue to consider the utilization of the space environment as an environment, just like the sensible atmosphere, or the sea or the land, to attain their end objectives, hence, those of the Nation.

We believe that these two programs can best be carried forward by having a single management over the civilian space exploration program, the nonmilitary space exploration program, and a single management, as I think there must be, over the defense end of the program.

We recognize that between these two activities there is much in common. We use the same launch pads, we will undoubtedly continue to use the same launch vehicles or elements of the same launch vehicles. We will use jointly some of the tracking stations that are situated around the world, some of them under military sponsorship and control, some of them under civilian sponsorship and control.

We believe, therefore, that it is highly desirable and indeed necessary that there be a real coordination at the management level between the Defense Department and NASA, and we propose to achieve that in the simplest and most straightforward and effective way we can. We have done this by ad hoc committees up to the present time. We propose to now formalize this in an activities coordinating board which would have Dr. Dryden as Deputy Administrator, as a cochairman with Dr. York, Director of Research and Engineering, Defense Research and Engineering, at the Pentagon. These men not only are able in themselves to deal technically, scientifically, with the problems that arise before them, but they are able to commit their organizations, and come back and see that the activities are undertaken that they agreed would be undertaken. They will be supported by panels. There might be a panel, for instance, in the field of launch vehicles, and the scheduling of pads. This is a panel which is going to be concerned with the interface relationships between the Defense Department and ourselves. There might be another panel on tracking stations and data acquisition.

Excuse me.

The CHAIRMAN. No, that is all right, you go ahead and finish.

Dr. GLENNAN. There might be a panel in the field of the biosciences and biomedical activities. These panels would be made up of the people that really have responsibility for conducting the programs on either side of this arrangement.

The chairmen of those panels, again drawn from the management levels, would come together as members of this activities coordinating board under the cochairmanship of Dr. Dryden and Dr. York.

Where there was necessity for resolving a difference which Dr. Dryden and Dr. York couldn't resolve, it would come directly to the Secretary of Defense and myself. If then we couldn't resolve it, it would go to the President, and I know of no simpler, more straightforward line of decisionmaking than that that I have just described.

The CHAIRMAN. Mr. McDonough? The time of the gentleman has expired.

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Mr. McDONOUGH. Dr. Glennan, I want to extend my congratulations to the progress you have made, and to your staff for the outstanding exhibition of scientific development in space that you have displayed in Tiros I and in Pioneer V. I never had any doubt that you would accomplish these things, and I feel confident that with the help of this legislation and the help of this committee you will do some very outstanding things.

You have described, I believe, in answer to Mr. King's question, the points that I wanted to raise. In other words, as I understand you, it is your desire that legislation should not be specific, but that there should be a broad area of coordination between Defense and the Space Administration?

Dr. GLENNAN. That is right, Mr. McDonough.

Mr. McDONOUGH. Here is a practical example I can conceive. We have Tiros before us this morning. There was no question in decisionmaking in arriving at that particular project. It is beneficial for civilian space exploration. If it is going to be beneficial for the military, from this they can proceed to adopt their particular military application to it if they want to, but you have at least given them the first step in that direction.

Dr. GLENNAN. That is right, Mr. McDonough, and they have been involved in this with us, as a matter of fact, in the technical management, and the determination of the broad specifications there has been, I think, rather complete coordination, and in the conduct of the program, as Dr. Dryden points out.

Mr. McDONOUGH. Now, with a similar communications satellite on a coordinated Earth circular orbit, the military can use what they can out of that to their benefit. You have done this with the present act which we have found, by a little experience for the last 20 months, is a little cumbersome. With more fluid legislation, such as we have before us, you will be able to accomplish even more, and I certainly agree with you. And I think that we should pass this legislation as it is written, and let time and experience prove its faults as we go along.

We certainly can't write a bill today that is going to be the perfect piece of legislation for the next 25 years. I doubt that very much.

Dr. GLENNAN. I think, Mr. McDonough, that there are no hidden balls in this proposal that we have before the committee and before the Congress, that it is indeed a sincere attempt to establish responsibilities and lines of authority in the simplest most straightforward, most effective manner. There is nothing else we are attempting to gain in this in the way of expanding horizons, or enlarging functional responsibilities, or anything of that sort.

It is simply: Please let us be organized so we can get on with this job.

Mr. McDONOUGH. That is all, Mr. Chairman.

The CHAIRMAN. Any further questions?

Mr. Chenoweth?

Mr. CHENOWETH. I don't have any questions, Mr. Chairman. I want to join in congratulating Dr. Glennan and Dr. Dryden and all of their staff on this outstanding job.

The CHAIRMAN. We all congratulated them this morning.

Mr. CHENOWETH. Dr. Glennan, you certainly justified the confidence I have always had in you. There have been some expressions of

doubt as to what we were going to do, and just how fast we were in this mad race to keep up with the Russians, and how far we are going into outer space. I have never had any doubt about whether we were going to do the job and excel the Russians in it. I think what you are doing here now confirms the fact that this is exactly what you are doing, and I certainly want to congratulate all of you and commend you on that great job you have done. I am certainly happy to see you make the headlines last week. This is the second time that has happened recently. I want you to keep that up. That is a great job you are doing, and I don't know of anything more important right now that could be done to give the American people the confidence they should have in this whole program than what you are doing.

Dr. GLENNAN. Thank you very much, Mr. Chenoweth. I would repeat the old saw that one swallow doesn't make a summer, and we don't think we have it made. We are very humble, really; proud but humble, in light of the accomplishments of a great many people that have come together to make these space probes and satellites work in the last 2 or 3 weeks. We know we are going to have troubles in the future. But we are confident that our method of attack now seems validated, that the kind of a program that we have laid on and the way we have been trying to go about it, in which we have had the support of this committee this far, seems to augur well for the future.

Mr. CHENOWETH. I hope what you have accomplished will silence some of the doubting Thomases who seem to have been so much in the news lately. I hope it will have that effect, if nothing else.

Dr. GLENNAN. It is almost too much to expect.

The CHAIRMAN. Mr. Van Pelt?

Mr. VAN PELT. Dr. Glennan, earlier this year, in testifying, you told us that you met very frequently with your deputies.

Dr. GLENNAN. Yes.

Mr. VAN PELT. To arrive at decisions. Witnesses following you have expressed some concern that they would be hesitant about expressing their views if they were in disagreement with the boss. Have you found anything like that?

Dr. GLENNAN. I am very grateful that that is not the case.

Mr. VAN PELT. I am glad.

Dr. GLENNAN. We don't have yes-men.

Mr. VAN PELT. That is what I wanted to know. And you don't have any concern for the future that as another witness expressed, that there might be too much inbreeding in the organization, if the decision-making was at that level?

Dr. GLENNAN. I think Mr. Van Pelt, that there won't be that sort of thing. If I might just expand a bit on the comments I was making in response to Congressman King's questions, this is a very large program; it involves a lot of the public's money; it isn't the sort of thing where a single man must make all of the decisions, although he must ultimately have the responsibility. Committees can't do that sort of thing.

We do propose—I do propose to have a distinguished group of men, scientists, engineers, people active in public life, advising me, advising the Office of the Administrator, if you will, on our program development, on just the whole gamut of matters which are part of our operating problem. I think that in this way we will gain active, almost day-by-day concern on a broad policy level with the development of

this program, in a way in which it was really not possible with the Space Council, where people were loaded down with other duties in the governmental structure and outside. I would want such an advisary committee to spend an adequate amount of time to really know what we are doing and to be helpful with their advice, not simply rubberstamps.

Mr. VAN PELT. Diverting from the bill for just a moment; earlier again in this session a great deal of concern was expressed about our losing prestige with the free nations of the world, because we hadn't been first in this field or that field, at least according to some of the alarmists. What use are we making of Pioneer V, and of this most recent satellite that you have up, the weather satellite that we have here? Is that information being distributed, and what has been the reaction on Pioneer V?

Dr. GLENNAN. We, of course, have very much better reading on Pioneer V than we do on Tiros, that is, a very new gadget up around the Earth. We have made a great deal of use of this through the good offices of the U.S. Information Agency. They have been very, very active. The results have been almost beyond my—well, they have been beyond my expectations, in some ways almost beyond belief, as a matter of fact.

The very hearty reception that the success of Pioneer V has had has resulted in statements—and I shall bring them to the committee if I am permitted—that are almost too extravagant, really, in saying this is the first real scientific space activity.

Mr. VAN PELT. About where would Pioneer V be today?

Dr. GLENNAN. Well over 3 million miles out, still talking loud and clear.

Mr. MCDONOUGH. On 5 watts?

Dr. GLENNAN. On the 5 watts, still; yes, sir.

I should like to say, Mr. Van Pelt, that we did suffer and we will continue to suffer some serious criticism, loss of confidence among peoples outside of our own country, but in a way we have contributed to this by our very democratic process, a necessary element, I think, in our way of life, of criticism, disappointment, all of that sort of thing. We have tended to emphasize the negative aspects of this. Some of us in the program have been as guilty of this as have other people in the country. I don't think we do ourselves very much good by beating ourselves around the barn.

Mr. VAN PELT. I have only one suggestion, Doctor. It was suggested here in the committee several days ago that perhaps a replica of one of these satellites should be placed in the lobby of the United Nations. I would just like to make this suggestion: Since you are developing a public relations program, perhaps one or two of these units with large placards could be placed under the dome of the Capitol, for in the next few weeks we are going to have thousands of students, as we do every Eastertime, going through the Capitol, and I think it would be helpful.

Dr. GLENNAN. Thank you, sir.

The CHAIRMAN. Will the gentleman yield?

It was suggested that this be placed under the dome of the Capitol, but I intervened and suggested that it was so well identified with the work of this committee that it would be preferable to display it in the committee's hearing room.

Mr. VAN PELT. I think this is fine this morning. I am not in disagreement with that.

The CHAIRMAN. How long will we have it here?

Dr. GLENNAN. It is not going to be in the committee room very long, sir. This is a working operation, you know, this is not a mockup. Everything in here, if we were as fortunate as we were last Friday, could be fired aloft and work.

The CHAIRMAN. Do you have one you could put under the dome of the Capitol?

Dr. GLENNAN. Could we examine into that?

We have under construction now a number of models of Pioneer V. We have the concern here with how many of these we could make. It is a matter of money, and we don't have a lot of empty pockets in our budget clothing, so that we have to take a look at how much of this we can do as public information.

The CHAIRMAN. Will you entertain that thought and give it some consideration?

Dr. GLENNAN. Surely will.

Dr. DRYDEN. Just to copy this Tiros satellite costs many hundreds of thousands of dollars. It is not an inexpensive matter to reproduce what you see in front of you.

The CHAIRMAN. I understand that, but it is an amazing thing.

Dr. GLENNAN. Yes.

The CHAIRMAN. Now let's see. Mr. Riehlman?

Mr. RIEHLMAN. Mr. Chairman, I think most of the questions that I have had in mind in respect to this legislation have been fairly well covered, but I do want to say just a few words to Dr. Glennan and Dr. Dryden and their staff for the tremendous accomplishment that has been made in the last 18 or 20 months in this field of space.

Following a bit of the discussion that was held with Congressman McDonough, about this being a pretty good illustration of what NASA is doing and what the Defense Department is doing in respect to weather and reconnaissance programs. I think that you could help me in my thinking, and probably the rest of the members here, if you could, in very few words, outline how your coordination in respect to the weather program and the reconnaissance program with the Navy has worked. There is not a lot of overlapping and duplication and redtape in these two programs, is there?

I think that is important for the committee to know, because we are vitally interested in seeing that you have legislation under which you can work properly to eliminate duplication and redtape, but under which decisions can be made. I conclude with this, before you give the answer, Dr. Glennan: I have explicit faith in Dr. Dryden and you, and I certainly have in Dr. York, as well. If there are disagreements or misunderstandings, I'm sure they can be settled, and decisions can be made without a lot of lost time in a most important program.

Now if I could have just a brief explanation, because I think it would help the committee.

Dr. GLENNAN. I would like to ask Dr. Dryden, who is very intimately associated with these interrelationships, to give you facts on this.

Mr. RIEHLMAN. That I think would be very helpful.

Dr. DRYDEN. I would like to begin with the meteorological satellite first, as one piece of the weather program. This project has been followed by both military and civilian members of the team. We have very close relations with the Weather Bureau; in fact, we have contributed to setting up a unit at Suitland, Md., which will take the results from this satellite and see how they fit into forecasting, which is their everyday activity.

For some months now they have been looking at cloud pictures taken from airplanes and a few from rockets, comparing them with weather maps and seeing what use could be made of similar photographs.

Now, we have the information which comes actually from the weather satellite, and in the course of a few weeks we will have studies of the relation of our pictures to the other weather information to establish a correlation and to establish a way in which these results would be used in the whole forecasting system.

Now, to speak of the broader picture, the Weather Bureau, of course, has the responsibility for the civil side of weather forecasting and the study of weather. NASA has no specific responsibility in this area. We are doing the satellite part in cooperation with them. We do not ourselves employ meteorologists to try to interpret the pictures. We are the technicians, if you like, in the use of this new tool.

The Weather Bureau has established mechanisms for coordination with the Federal Aviation Agency and with the Department of Defense. Their whole system of observation is integrated into a network. I am not in a position to speak with authority on the details.

More than this, internationally our Weather Bureau, of course, cooperates with the World Meteorological Organization, and as you probably know, meteorological observations all over the world are sent to central points in each country. We receive regular weather observations from Soviet Russia, the standard type of weather observations, and we expect, of course, that the information that we develop between the Weather Bureau and ourselves, with the meteorological satellite, will be made available internationally, although not at present on what we call a real-time basis. Our present satellite observations are being read to develop the methods, the techniques, to see how they work, and it will be some time before we can have an operational system which will report the weather all over the world. This is very briefly the relations between the various organizations concerned with weather forecasts.

Mr. RIEHLMAN. Of course, this has a great relationship to the Navy's program, too.

Dr. DRYDEN. The Navy is a part of the Department of Defense. The Navy and the Air Force are the primary weather observers in the military. The Navy, in their sea operations, also operate flights specifically for the purpose of observing weather.

Mr. RIEHLMAN. I want to close with just this statement: I certainly am elated with what has happened. I recognize we are in a field of keen competition, and we probably can expect some other advances on the part of other nations that may cause us to question just how far we are ahead. But certainly up to this point I think that we have a great deal to be very thankful for in this country. This program is in the hands of capable and efficient people who are striving to lead the world in this field of exploration of space.

The CHAIRMAN. Mr. Sisk?

Mr. SISK. Dr. Glennan, I would like to refer you to page 9 of the bill, section 309. Very shortly we must come to some conclusion on this piece of legislation. Are you familiar with the recommendations that General Schriever made? Possibly some other witnesses made similar recommendations with reference to striking out a considerable portion of section 309, since there may be some redundant and possibly superfluous language? Are you familiar at all with that?

Dr. GLENNAN. I don't recall at the moment, Mr. Sisk. Could you point it out?

Mr. SISK. If you have the bill in front of you so you can follow it——

Dr. GLENNAN. I have it.

Mr. SISK. "Nothing in this act shall preclude the Department of Defense from undertaking such activities in space." You see, if we strike some words there, "In space and the research and development effort toward that end as may be necessary for the defense of the United States.", striking the balance of that language. Keeping that in mind, then to strike out subsection (b), entirely, as being something that would be done anyway; leaving subsection (c) in and striking out (d) entirely, because again this is a reiteration of what would happen in the event the Secretary of Defense was dissatisfied with what you were doing, and so on.

Now, I would like to have your comments on that. This is a tightening up of this language and doing away with some language that I have some question about. And I might say, Mr. McCormack asked a number of questions on this subject here some time ago. He asked them of General Trudeau and of General Schriever.

Dr. GLENNAN. Mr. Sisk, the language contained in 309 is, in essence, Defense Department language, so that General Schriever, in suggesting these changes, is suggesting changes in the language proposed by the Defense Department. We believe, of course, that the Defense Department has adequate authority in its own legislation to do what it needs to do for defense of the Nation, utilizing the space environment anyway they want.

We think that is the case. We left this in here in order that in this organic act discussing space there would be nothing derogating from that authority, and I believe the President used words similar to that.

Mr. SISK. I appreciate that this is the so-called Department of Defense language.

Dr. GLENNAN. That is right.

Mr. SISK. But the point is that if we should strike this, for example amend subsection (a) and strike out subsections (b) and (d), do you have any concern about that?

Dr. GLENNAN. Yes; I would have.

Mr. SISK. After all, you propose this language, too. I am not taking a position for or against this legislation.

Dr. GLENNAN. Was this subsection (b), for boy?

Mr. SISK. Yes, striking out subsection (b), as in boy, that is the one that says in order to accomplish——

Dr. GLENNAN. I would have concern about that.

Mr. SISK. Beg pardon?

Dr. GLENNAN. I would have concern about that.

Mr. SISK. You feel that should stay in the bill?

Dr. GLENNAN. Yes. I think this is an interface between the Defense Department and ourselves, where very large amounts of money are involved, where a possibility of starting more systems than really are useful in this space exploration, use-of-space situation would warrant.

What we are after, Mr. Sisk, is the smallest number of launch vehicle systems that will serve the purposes of the Defense Department and ourselves, so that they can be used with greater frequency and thus we think develop the kind of reliability we all must seek, because these are expensive, they take time to build, they are destroyed effectively when they are fired once.

So that we would feel that having this subsection (b), for boy, in the act does put a little bit of a brake on either one of us starting off on our own to develop new and expensive and involved systems; yes.

Now, going back to——

Mr. SISK. The last section, just a brief comment. I think my time has run out. On subsection (d), do you feel that is also needed in the act?

Dr. GLENNAN. I don't see any reason for its being needed in the act. It is retained from the present act, it is the sort of thing that must go on anyway. We do report, each of us, to the Secretary of Defense—to the President. It would be normal for us in the event of a real disagreement to go to the President. So we do it whether it it is in the act or not, but we retain it because you had it in the original act.

The CHAIRMAN. Doctor, may I ask you a question or two? You object to any changes in this. Your objection doesn't go so far that you object to the amendment which the committee approved covering the policy on patent rights?

Dr. GLENNAN. No, sir.

The CHAIRMAN. You approve that?

Dr. GLENNAN. Yes, sir.

The CHAIRMAN. Now, isn't there something in this bill that we haven't covered today which has reference to damages sustained from satellites?

Dr. GLENNAN. Could you repeat that?

The CHAIRMAN. Is there anything in the bill covering the matter of damages from satellites?

Dr. GLENNAN. Could I ask Mr. Johnson?

Mr. JOHNSON. Mr. Chairman, there is nothing dealing with that matter specifically; that is, the extent of governmental liability as a result of satellite damage, but perhaps you have in mind the proposed new section 308, on indemnification, which would enable us to indemnify contractors in connection wtih liability which they might otherwise suffer.

The CHAIRMAN. That is section 308?

Mr. JOHNSON. 308; yes, sir.

The CHAIRMAN. Is it in this bill?

Mr. JOHNSON. I was reading from the committee print.

The CHAIRMAN. I wish you would give us a little better explanation of that, because I notice the record is rather bereft of any allusion to that matter.

Mr. JOHNSON. Mr. Chairman, I testified on that at an earlier appearance.

The CHAIRMAN. I think you did. I think you were the only one, though.

Mr. JOHNSON. It was covered in a prepared statement; yes, sir.

The CHAIRMAN. That is a very important thing. It could involve a terrific amount of money, couldn't it?

Mr. JOHNSON. It could.

The CHAIRMAN. How much could it involve?

Mr. JOHNSON. There is no limit expressed in this particular section, so that the liability could conceivably be unlimited.

The CHAIRMAN. Don't you think we should put a limit on it?

Mr. JOHNSON. We had testified earlier that we would not object to having the same limit imposed here as is imposed in the atomic energy legislation concerning indemnification. That is a $500 million limit. If this authority is to be useful, of course, the limit has to be very high. Now, a bit of history might be useful here. What we are asking for is simply the same authority, in identical terms, as that which the Department of Defense now has in the research and development field. Our proposed new section 308 is limited to research and development contracts.

The CHAIRMAN. But wait——

Mr. JOHNSON. Excuse me.

The CHAIRMAN. Do you mean to say that the Department of Defense has this indemnity authority?

Mr. JOHNSON. Yes, sir. Our proposed section 308 is word-for-word identical with that now possessed by the Department of Defense, except that we substitute references to the administrator and NASA for those which refer to the military departments in the present legislation. Now, there is more to the history than that, however.

Recognizing that research and development contracts are not the only occasions which give rise to this potentially enormous liability, about a year ago NASA and the Department of Defense joined in sending up identical bills. This committee received the bill which NASA sent up, and the Armed Services Committees received the bill sent up by the Department of Defense, which would provide broader indemnification authority than that contained in proposed section 308. The bill which has been pending before the Congress for the past year would apply not only to research and development contracts, but to construction and supply contracts, every type of contract under which this kind of——

The CHAIRMAN. You sent it up, but I don't believe we have ever got any clearance on that.

Have we?

Mr. DUCANDER. Yes, sir; it is a Department bill.

The CHAIRMAN. Has that been cleared?

Mr. DUCANDER. Yes, sir.

The CHAIRMAN. That is the one other bill that has been cleared?

Mr. DUCANDER. Yes, sir.

The CHAIRMAN. All right. Has the Armed Services Committee taken up the Department of Defense bill?

Mr. JOHNSON. The Armed Services Committee has at least not reported the bill out. I don't know whether they have taken it up, Mr. Chairman. They did request comments from the Comptroller General. Last year they received those comments. So far as I am aware,

the bill is still pending before the Armed Services Committees. It was the judgment of this committee and the Senate committee last year that the initiative should be left with the Armed Services Committees, since the Department of Defense has a larger stake in that bill.

Now, the inability to move that bill forward led us to request more modest authority in this legislation now pending before you. We felt that while the Congress was considering enlarging the authority of the Department of Defense, there should be little difficulty in giving us at least identical authority to that which the Department of Defense now possesses. That is all we are asking for in section 308.

The CHAIRMAN. My time has expired, but could you put in for the record some idea of what this has cost the Government under the Atomic Energy Act, and your estimate of what this might cost the Government if this sort of indemnity is included in the Space Act?

Dr. GLENNAN. We will be glad to put that in the record. I think it is a fact that the AEC has had no claims under this.

The CHAIRMAN. No claims at all?

Dr. GLENNAN. No.

The CHAIRMAN. Now, any further questions?

Mr. Hechler?

Mr. HECHLER. Dr. Glennan, in the abolition of the Space Council I am concerned that you are eliminating here from the coordinating process the role of the State Department, the Federal Communications Commission, the National Science Foundation. What means do you propose to coordinate the activities of these other agencies that were mentioned in the President's message to Congress of February 22, 1960?

Dr. GLENNAN. Mr. Hechler, everything we do in the international field is done with the advice of and the strong support of the State Department. There is day-by-day contact there that seems to me to be so much more effective than anything that could possibly take place in the Space Council meeting. These tend to become meetings where one reports and may talk about policy and that type of thing, but when you set them over an operating agency, they either must have management authority or they lose their real effectiveness, it seems to me.

Mr. HECHLER. Yes.

Dr. GLENNAN. And I don't think you want that.

Mr. HECHLER. I think I understand your position on that. Now just one quick question. You mention here on page 11 the only justification for the creation of a space czar is that someone other than the President is needed to exercise the President's ultimate authority and power of decision over the Secretary of Defense and the Administrator of NASA.

Dr. GLENNAN. Yes.

Mr. HECHLER. Just so I can make my position clear here, what I am trying to do in the selection of such an individual is simply to extend and make stronger the power of the President, to clothe the President's scientific adviser, if you will, with sufficient authority that he can be the extension of the President, within the Presidential office. And I would add, as an aside, I am sure you, as a Presidential appointee, would not agree with this, but my position is motivated by the fact that when you have a weak President, that you need a

strengthening of this office, and I believe that in article II of the Constitution we have set up a very, very powerful official who can set the goals, who can make the clear-cut decisions, and all I am suggesting is that he be given the extended authority to move us forward on this program with the utmost urgency.

Dr. GLENNAN. I think that the interposition of the science adviser to the President with that kind of authority would tend to slow us down, Mr. Hechler. I would feel it incumbent upon me, for most of the serious matters that I deal with, to go to him for advice, counsel and consent, and this can be nothing but delay.

Today I see the President at rather frequent intervals, I tell him what we are doing, tell him what we propose to do. He gives me his advice on these things. I sometimes take questions to him, which he resolves with me, usually with some staff members there, or perhaps calling in the others. There is a direct line, a direct action-reaction pattern setup that I think bodes well for the future. I think the other would just slow us down.

Mr. HECHLER. I am glad you brought this out, because I think it illustrates the difference of our positions, which I think the record should show.

Thank you.

Dr. GLENNAN. Yes, sir.

The CHAIRMAN. Mr. Johnson, since we have gone around here, I would like to ask you a few questions about this indemnity. On last Thursday we read into the record a letter from the Comptroller General of the United States, dated March 29, 1960. You have seen that letter, I am sure?

Mr. JOHNSON. I have only heard of the letter. I have not seen it yet, Mr. Chairman.

The CHAIRMAN. He suggested certain changes. For instance, he recommends we add the words "but only to the extent that they," meaning damages, "arise out of the direct performance of the contract and to the extent not compensated by insurance or otherwise."

He makes a number of other suggestions. Would it be imposing for you and your office to go over that letter carefully and come here later and give us your ideas what amendments you think are worthy of consideration?

Mr. JOHNSON. We would be happy to do that, Mr. Chairman.

I would like to make this one observation: Since the more comprehensive legislation is pending before the Congress, I would hope that it would be in connection with that bill. The Congress should attempt to deal comprehensively with all of the Comptroller General's points. This could be considered as interim legislation to put us in parity with the Department of Defense until a more comprehensive treatment could be accomplished.

The CHAIRMAN. Let me ask you this: Has NASA ever asked for hearings on this comprehensive legislation?

Mr. JOHNSON. I know that we expressed ourselves informally several times last year that it was, aside from the authorization and appropriation legislation, the piece of legislation with which we were most urgently concerned. I am quite certain that that sentiment was conveyed to the committee. I don't know exactly in what form.

The CHAIRMAN. Are you prepared for hearings on it now?

Mr. JOHNSON. Yes, sir.

The CHAIRMAN. You are prepared now. You would rather take up the comprehensive bill than to put this into this bill even as a temporary stopgap?

Mr. JOHNSON. No, sir. We would prefer to have this enacted at this time because we feel this could be done with little difficulty, in view of the fact that it simply follows word for word the pattern already on the statute books, and simply extends to us existing authority. This would give us, we would hope, what we need to do business on the best basis as quickly as possible.

On the other hand, we would like to go right ahead with the more comprehensive bill, too.

The CHAIRMAN. If that is the case, what is the objection to considering the Comptroller General's recommendations at this time?

Mr. JOHNSON. We will certainly do that, if that is the committee's desire.

The CHAIRMAN. It seems to me we wouldn't want a careless piece of legislation put through. You would want it carefully studied. If the Comptroller General is right, for instance, regarding the provision that I read to you a moment ago, which would limit the liability to damages arising from direct performance of the contractor to the extent not compensated by insurance or otherwise, those words might well be useful in tightening up the legislation.

Dr. GLENNAN. Mr. Chairman, we will be glad to comment on that in writing to you.

The CHAIRMAN. All right. If you will study it later on when we get to that during the course of the week, we will call on you.

Dr. GLENNAN. Thank you, sir.

The CHAIRMAN. Are there any further questions?

(No response.)

The CHAIRMAN. If not, we want to thank you gentlemen.

Dr. Glennan has been kind enough to agree to come back to us and discuss in executive session any problems we run into. So we are going to avail ourselves of your services and those of your chief counsel, too.

Dr. GLENNAN. Any time. Thank you, sir.

Mr. SISK. Could I be heard briefly?

The CHAIRMAN. Yes. Mr. Sisk is recognized.

Mr. SISK. Last week the committee passed on the Mitchell subcommittee recommendations on the amendment to change the patent laws. I find myself torn between my very high regard of the gentleman from Georgia, Mr. Mitchell, and the other members of the committee. However, I do feel strongly about some things in the patent provision. For the record, I simply want to say at the present time that I wish to join with Mr. Quigley in a minority report on that section, and shall at this time vigorously oppose the passage of the recommended patent changes.

Thank you.

The CHAIRMAN. Is there any further statement?

Any further business to come before the session this morning?

(No response.)

The CHAIRMAN. I think it would be better to adjourn until tomorrow morning. We can take up the bill at that time. If there is no objection, we will adjourn until tomorrow morning at 10 o'clock.

(Whereupon, at 11:44 a.m., the committee adjourned.)

[COMMITTEE PRINT]

PROPOSED REVISIONS TO THE PATENT SECTION, NATIONAL AERONAUTICS AND SPACE ACT OF 1958

REPORT

OF THE

SUBCOMMITTEE ON PATENTS AND SCIENTIFIC INVENTIONS

TO THE

COMMITTEE ON SCIENCE AND ASTRONAUTICS
U.S. HOUSE OF REPRESENTATIVES

EIGHTY-SIXTH CONGRESS

SECOND SESSION

Printed for the use of the Committee on Science and Astronautics

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LETTER OF TRANSMITTAL

MARCH 8, 1960.

Hon. OVERTON BROOKS,
Chairman, Committee on Science and Astronautics.

DEAR MR. CHAIRMAN: The Subcommittee on Patents and Scientific Inventions herewith submits a report on "Proposed Revisions to the Patent Section, National Aeronautics and Space Act of 1958."

In response to your instructions, this report contains the findings and recommendations of the subcommittee pursuant to a study of the space research patent problem. The subcommittee was unanimous in its determination that a change in the patent section of the current law is necessary and necessary now. While the subcommittee was not unanimous in its opinions of the best way to effect the desired changes, the solution finally agreed upon is one to which a majority of members have subscribed as reasonable or practicable.

The subcommittee wishes to acknowledge the invaluable services of Francis C. Browne, a senior partner of Mead, Browne, Schuyler & Beveridge, Washington, D.C., as technical adviser throughout the subcommittee's inquiry. It also wishes to express its thanks to George J. Feldman, executive director and chief counsel of the former House Select Committee on Astronautics and Space Exploration, for serving as special consultant in the study phases of the subcommittee's work.

The subcommittee believes that this report, prepared by professional staff member Philip B. Yeager in consultation with John A. Carstarphen, counsel, will provide the full committee with an effective picture of the complex problems of Government interests in and ownership of inventions produced under space research programs.

ERWIN MITCHELL,
Chairman, Subcommittee on Patents and Scientific Inventions.

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PROPOSED REVISIONS TO THE PATENT SECTION, NATIONAL AERONAUTICS AND SPACE ACT OF 1958

PART I—BACKGROUND

History of the Patent Provision of the National Aeronautics and Space Act of 1958

On April 2, 1958, President Eisenhower in a message to Congress proposed the establishment of a new National Aeronautics and Space Agency. This Agency was to have responsibility for civilian space and aeronautical research and operation, and its general function would be the advancement of a coordinated national space program.

Shortly thereafter both the House of Representatives and the Senate created special committees to deal with this problem. In the House the committee was designated the Select Committee on Astronautics and Space Exploration; the chairman was Representative John W. McCormack, of Massachusetts. The Senate committee was designated the Special Committee on Space and Astronautics with Senator Lyndon B. Johnson, of Texas, serving as chairman.

On April 15, 1958, the House select committee opened hearings on ways and means of formulating and effecting a national space program. The committee had before it a dozen bills introduced by various Members of the House, including the administration's request as introduced by Representative McCormack, H.R. 11881. This bill did not contain a provision relating to the treatment of patents or property rights in inventions. The President's message was also silent on the point.

Hearings continued until May 12, 1958, during which time 51 witnesses were heard. The question of patent ownership, insofar as the proposed Space Agency was concerned, was not discussed in detail during these hearings; in fact, it was rarely mentioned.

Following the close of the hearings, however, and during executive sessions, the select committee determined that some provision governing the ownership of inventions produced under the space program with the aid of Government funds should be incorporated into the law in order to protect the public interest. Thus when the committee reported out a clean bill to create a civilian Space Agency, the new bill contained a brief patents provision patterned after certain sections of the Atomic Energy Act of 1946 as amended.

The provision on patent rights was section 407 of H.R. 12575 and was as follows:

> Sec. 407. (a) Any invention or discovery made or conceived under any contract, subcontract, arrangement, or other relationship with the Administrator, regardless of whether the contract or arrangement involved the expenditure of funds by the Administrator, shall be deemed to have been made or conceived by the Administration, except that the Administrator may waive the Administration's claim to any such invention or discovery under such circumstances as the Administrator may deem appropriate.
>
> (b) In any case where the Administrator waives the Administration's claim to an invention or discovery as authorized by subsection (a), the Administrator

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shall retain the full right to use such invention or discovery in carrying out his functions under this Act and to license other persons on such terms and conditions as he may deem appropriate to use such invention or discovery in the conduct of any activities authorized by or under this Act. In any such case the Administrator may provide for the payment by the Administration or by the other persons licensed under this subsection, for the use of the invention or discovery, of a reasonable royalty fee determined by the Administrator in accordance with such standards and procedures as he may by regulation establish.

(c) In any case where the Administrator does not waive the Administration's claim to an invention or discovery which is deemed to have been made or conceived by the Administration under subsection (a), the Administrator may grant to the persons who made or conceived the invention or discovery, as compensation therefor, a cash award in an amount determined by the Administrator in accordance with such standards and procedures as he may by regulation establish.

On June 2, 1958, the House of Representatives unanimously passed H.R. 12575 with the foregoing provision intact. The provision itself received little attention during House debate on the bill.

Meanwhile the Senate Special Committee on Space and Astronautics had been holding hearings of its own on a number of Senate bills, including S. 3609, sponsored jointly by Senator Johnson and Senator Styles Bridges, of New Hampshire. The Senate bill, as was the case with the House bill first introduced, contained no patents provision.

Following the passage of H.R. 12575 by the House, a marked interest in the new patent section was manifested through representatives of industry and the legal profession. Because of the intensity of this interest, which mainly displayed dissatisfaction with the provision, Chairman McCormack appointed a patent subcommittee to review the matter prior to any conference which might be held on H.R. 12575. The subcommittee chairman was Representative William H. Natcher, of Kentucky. Other members were: Representatives Brooks Hays, Arkansas; Lee Metcalf, Montana; Leslie C. Arends, Illinois; Gordon L. McDonough, California; Kenneth B. Keating, New York. The subcommittee and its staff discussed the problems involved with many interested parties, both Government and private, for several weeks. On the basis of its investigation the subcommittee recommended a revised patent section to be considered in conference and submitted it to the full committee. The suggested substitute was as follows:

SUBSTITUTE FOR SECTION 407 OF H.R. 12575—PROPERTY RIGHTS IN INVENTIONS

SEC. 407. (a) Whenever the Administrator determines that an invention or discovery was conceived, reduced to practice, developed, or otherwise made under, pursuant to, or as a result of any contract, subcontract, or other arrangement entered into, with, or on behalf of the Administration, the Administrator shall determine, under subsection (b), whether he is entitled to all right, title, and interest in and to such invention or discovery. In the event he determines that he is not entitled to all right, title, and interest in and to such an invention or discovery he shall require the person who conceived, reduced to practice, developed, or otherwise made the invention or discovery (or his successor in interest) to grant to him a nonexclusive, irrevocable, royalty-free, worldwide license to make, use, and dispose of the invention or discovery, or to have the invention or discovery made, used, or disposed of, for governmental purposes.

(b) The Administrator shall be entitled to, and may require the assignment to him of, all right, title, and interest in and to an invention or discovery referred to in the first sentence if he finds that—

(1) the person who conceived, reduced to practice, developed, or otherwise made the invention or discovery was employed or assigned to perform research, development, or exploration work and the invention or discovery is directly related to the work he was employed or assigned to perform, or that it was within the scope of his employment duties, whether or not it was

made during working hours, or with a contribution by the Government of the use of Government facilities, equipment, materials, allocated funds, information proprietary to the Government or services of Government employees during working hours, or

(2) the person who conceived, reduced to practice, developed, or otherwise made the invention or discovery was not employed or assigned to perform research, development, or exploration work, but the invention or discovery is nevertheless directly related to the contract or to the work or duties he was employed or assigned to perform and was made during working hours, or with a contribution from the Government of the sort referred to in clause (1).

(c) The Administration shall be considered a defense agency of the United States for the purpose of chapter 17 of title 35 of the United States Code.

(d) The Administrator may acquire, purchase, and hold patents and other property rights in inventions and discoveries, and he may use, lease, license (exclusively or nonexclusively), grant, exchange, sell, and otherwise dispose of the whole or any part of an invention or discovery to which he retains title under this section. As herein provided, the Administrator may, in cases where he has a right to title under this section, accept a license in lieu thereof when such action is deemed by him to be in the national interest.

(e) The Administrator is authorized to take all suitable and necessary steps to protect any invention or discovery to which he has title, and to require that contractors or persons who retain title to inventions or discoveries under this section protect the inventions or discoveries to which the Administration acquires a license of use.

(f) To enable him to carry out his duties under this Act, the Administrator, under regulations to be prescribed by him, may require all parties who have entered into contracts, subcontracts, or other arrangements with or on behalf of the Administration, to disclose all necessary technical data and other pertinent and followup information relating to inventions and discoveries made by them or their employees. Such regulations shall require the contractor to make disclosure in writing of each invention or discovery to which subsection (a) may apply promptly after its conception or first actual reduction to practice. Any person who shall reduce to practice any patentable invention or discovery and who is or has within six months been employed under or pursuant to any contract, subcontract, or other arrangement involving research, development, or exploration, shall be deemed prima facie to have conceived, reduced to practice, developed, or otherwise made such invention within the meaning of this section.

(g) In any case in which the Administrator retains title to an invention or discovery under this section, he may grant to the individual or individuals who conceived, reduced to practice, developed, or otherwise made the invention or discovery an incentive cash award in an amount determined by the Administrator in accordance with such standards and procedures as he may by regulation establish. Notwithstanding any agreement to the contrary entered into as a condition of or incident to his employment, such individual may not be required to pay such award over to his employer or other person

(h) There is hereby established within the Administration an Inventions Review Board which shall consist of three members appointed by the President by and with the advice and consent of the Senate. Members of the Board, while attending conferences and meetings of the Board, shall be entitled to receive compensation at a rate to be fixed by the Administrator, but not exceeding $75 per diem, and while away from their homes or regular places of business they may be allowed travel expenses, including per diem in lieu of subsistence, as authorized by law for persons in the Government service employed intermittently. Members of the Board may serve as such without regard to the provisions of section 281, 283, or 284 of title 18 of the United States Code, except insofar as such sections may prohibit members from receiving compensation in respect of any particular matter which directly involves the Administrator or in which the Administration is directly interested.

(i) Any interested person who is dissatisfied with the Administrator's action under subsection (a) or (b), may appeal to the Inventions Review Board within 90 days from the date of such action. The Board shall hear and decide the issues presented in accordance with the Administrative Procedure Act. Any interested person who is dissatisfied with the decision of the Board under the preceding sentence may appeal such decision to the United States district court for the district in which he resides. The summons and notice of appeal may be served at any place in the United States. Such appeal shall be governed by the

provisions of Section 10 of the Administrative Procedure Act, and, for the purposes of that Act, the decision of the Inventions Review Board shall constitute the final agency action with respect to the issues involved in the appeal. The judgment of the court shall be subject to review by the appropriate United States court of appeals and the Supreme Court of the United States as provided in sections 1291 and 1254 of title 28 of the United States Code.

The Natcher subcommittee, in its report, noted that section 407, as it then stood, tended to be "arbitrary and restrictive" and might "stifle interest and private endeavor in the space research and development field." The subcommittee, however, added this comment: "The subcommittee is of the opinion that the bill should contain a patent rights provision which will protect the legitimate interests of the United States." In taking this position the subcommittee's primary reasoning appeared to be this: Since the concept of space exploration and scientific developments pursuant thereto were so new, so uncertain, and could have such potential, it might be inappropriate to leave the ownership of significant discoveries developed at Government expense in the hands of private persons.

On June 11, 1958, the Senate special committee reported S. 3609, amended to include a patents provision identical to that of the House-passed bill, H.R. 12575. On June 16 the Senate passed H.R. 12575, having substituted the text of S. 3609 for the House text. However, the Senate struck the patent section out of the bill entirely, explaining that its purpose was to allow the matter to be considered at greater length in conference. Prior to the conference a new patent provision was drafted, modeled largely after provisions in the Atomic Energy Act.

In conference, on July 15, 1958, House and Senate conferees adopted a compromise version of H.R. 12575 creating the National Aeronautics and Space Administration. Conferees also inserted a new patent provision in the act. This provision incorporated the standards devised by the House subcommittee to determine the circumstances under which inventions shall be deemed Government-sponsored and thus Government-owned, but was more restrictive of private patent rights and contained new provisions for disclosure and enforcement as well as a different system of administrative appeal. The new version became section 305 of the National Aeronautics and Space Act of 1958 as follows:

PROPERTY RIGHTS IN INVENTIONS

SEC. 305. (a) Whenever any invention is made in the performance of any work under any contract of the Administration, and the Administrator determines that—

(1) the person who made the invention was employed or assigned to perform research, development, or exploration work and the invention is related to the work he was employed or assigned to perform, or that it was within the scope of his employment duties, whether or not it was made during working hours, or with a contribution by the Government of the use of Government facilities, equipment, materials, allocated funds, information proprietary to the Government, or services of Government employees during working hours; or

(2) the person who made the invention was not employed or assigned to perform research, development, or exploration work, but the invention is nevertheless related to the contract, or to the work or duties he was employed or assigned to perform, and was made during working hours, or with a contribution from the Government of the sort referred to in clause (1),

such invention shall be the exclusive property of the United States, and if such invention is patentable a patent therefor shall be issued to the United States upon application made by the Administrator, unless the Administrator waives all or

any part of the rights of the United States to such invention in conformity with the provisions of subsection (f) of this section.

(b) Each contract entered into by the Administrator with any party for the performance of any work shall contain effective provisions under which such party shall furnish promptly to the Administrator a written report containing full and complete technical information concerning any invention, discovery, improvement, or innovation which may be made in the performance of any such work.

(c) No patent may be issued to any applicant other than the Administrator for any invention which appears to the Commissioner of Patents to have significant utility in the conduct of aeronautical and space activities unless the applicant files with the Commissioner, with the application or within thirty days after request therefor by the Commissioner, a written statement executed under oath setting forth the full facts concerning the circumstances under which such invention was made and stating the relationship (if any) of such invention to the performance of any work under any contract of the Administration. Copies of each such statement and the application to which it relates shall be transmitted forthwith by the Commissioner to the Administrator.

(d) Upon any application as to which any such statement has been transmitted to the Administrator, the Commissioner may, if the invention is patentable, issue a patent to the applicant unless the Administrator, within ninety days after receipt of such application and statement, requests that such patent be issued to him on behalf of the United States. If, within such time, the Administrator files such a request with the Commissioner, the Commissioner shall transmit notice thereof to the applicant, and shall issue such patent to the Administrator unless the applicant within thirty days after receipt of such notice requests a hearing before a Board of Patent Interferences on the question whether the Administrator is entitled under this section to receive such patent. The Board may hear and determine, in accordance with rules and procedures established for interference cases, the question so presented, and its determination shall be subject to appeal by the applicant or by the Administrator to the Court of Customs and Patent Appeals in accordance with procedures governing appeals from decisions of the Board of Patent Interferences in other proceedings.

(e) Whenever any patent has been issued to any applicant in conformity with subsection (d), and the Administrator thereafter has reason to believe that the statement filed by the applicant in connection therewith contained any false representation of any material fact, the Administrator within five years after the date of issuance of such patent may file with the Commissioner a request for the transfer to the Administrator of title to such patent on the records of the Commissioner. Notice of any such request shall be transmitted by the Commissioner to the owner of record of such patent, and title to such patent shall be so transferred to the Administrator unless within thirty days after receipt of such notice such owner of record requests a hearing before a Board of Patent Interferences on the question whether any such false representation was contained in such statement. Such question shall be heard and determined, and determination thereof shall be subject to review, in the manner prescribed by subsection (d) for questions arising thereunder. No request made by the Administrator under this subsection for the transfer of title to any patent, and no prosecution for the violation of criminal statute, shall be barred by any failure of the Administrator to make a request under subsection (d) for the issuance of such patent to him, or by any notice previously given by the Administrator stating that he had no objection to the issuance of such patent to the applicant therefor.

(f) Under such regulations in conformity with this subsection as the Administrator shall prescribe, he may waive all or any part of the rights of the United States under this section with respect to any invention or class of inventions made or which may be made by any person or class of persons in the performance of any work required by any contract of the Administration if the Administrator determines that the interests of the United States will be served thereby. Any such waiver may be made upon such terms and under such conditions as the Administrator shall determine to be required for the protection of the interests of the United States. Each such waiver made with respect to any invention shall be subject to the reservation by the Administrator of an irrevocable, nonexclusive, nontransferrable, royalty-free license for the practice of such invention throughout the world by or on behalf of the United States or any foreign government pursuant to any treaty or agreement with the United States. Each proposal for any waiver under this subsection shall be referred to an Inventions and Contributions Board which shall be established by the Administrator within the Administration. Such Board shall accord to each interested party an opportunity for hearing, and

shall transmit to the Administrator its findings of fact with respect to such proposal and its recommendations for action to be taken with respect thereto.

(g) The Administrator shall determine, and promulgate regulations specifying, the terms and conditions upon which licenses will be granted by the Administration for the practice by any person (other than an agency of the United States) of any invention for which the Administrator holds a patent on behalf of the United States.

(h) The Administrator is authorized to take all suitable and necessary steps to protect any invention or discovery to which he has title, and to require that contractors or persons who retain title to inventions or discoveries under this section protect the inventions or discoveries to which the Administration has or may acquire a license of use.

(i) The Administration shall be considered a defense agency of the United States for the purpose of chapter 17 of title 35 of the United States Code.

(j) As used in this section—

(1) the term "person" means any individual, partnership, corporation, association, institution, or other entity;

(2) the term "contract" means any actual or proposed contract, agreement, understanding, or other arrangement, and includes any assignment, substitution of parties, or subcontract executed or entered into thereunder; and

(3) the term "made," when used in relation to any invention, means the conception or first actual reduction to practice of such invention.

The report of the House and Senate conferees was adopted July 16, 1958, by both Chambers and the act became law on July 29 when signed by the President.

Subsequent Developments

Ever since the National Aeronautics and Space Act of 1958 was put into effect, its so-called patent section, section 305, has been subjected to increasing criticism from industry and the professions. Critics have regarded the provision as a step away from those constitutional requirements which are designed to protect the interests of the inventor as well as foster the open publication of inventions. They have expressed particular concern inasmuch as the National Aeronautics and Space Act patent provision is the third instance since World War II in which Government ownership of inventions has been dealt with by statute. The other instances were the enactment of the Atomic Energy Act of 1946, under which the Government asserts ownership of inventions, and the National Science Foundation Act of 1950, which gives discretion to its Director as to the disposition of rights in inventions and patents.

It was largely for these reasons—plus the fact that the National Aeronautics and Space Administration has now had some experience with the practical application of the provision—that the matter has been reviewed under the aegis of the standing House Committee on Science and Astronautics.

In August 1959, Representative Overton Brooks, of Louisiana, chairman of the committee, appointed a special Subcommittee on Patents and Scientific Inventions. He appointed Representative Erwin Mitchell, of Georgia, as chairman. Other members are Representatives James M. Quigley, Pennsylvania; Emilio Daddario, Connecticut; David S. King, Utah; James G. Fulton, Pennsylvania; J. Edgar Chenoweth, Colorado; and Perkins Bass, New Hampshire.

The new subcommittee undertook initial background hearings immediately. Representatives from the National Aeronautics and Space Administration appeared on August 19 and 20, 1959, in order

to brief the subcommittee and advise it on the effect of the patent provision of the Space Act as it now stands. During these hearings Space Administration officials disclosed that they planned to ask for a change in the provision as part of their 1960 legislative program. For this reason, more extensive hearings were scheduled at a later date in order to give the Space Administration an opportunity to finalize its planned revision and have it cleared by proper authorities.

On November 30, 1959, the subcommittee met to consider the problem in detail. In the course of 12 sessions, running from November 30 through December 5, the subcommittee endeavored to hear all competent Government witnesses as well as all private witnesses who wished to appear.

The General Counsel for the National Aeronautics and Space Administration, Mr. John A. Johnson, inaugurated the hearings by presenting NASA's proposed revision, subsequently introduced on request by Mr. Brooks, January 11, 1960. The proposal is as follows:

A BILL to amend Section 305 of the National Aeronautics and Space Act of 1958 entitled "Property Rights in Inventions," and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the National Aeronautics and Space Act of 1958, as amended, is amended by striking out the Section 305 thereof, and substituting therefor a new Section 305, entitled "Property Rights in Inventions," which reads as follows:

"PROPERTY RIGHTS IN INVENTIONS

"SEC. 305. (a) Each contract or other arrangement entered into by the Administration, and each subcontract at all tiers thereunder, which has as one of its purposes the performance of experimental, developmental, or research work, shall contain provisions prescribed by the Administrator governing the disposition of the rights to inventions conceived or first actually reduced to practice thereunder in a manner calculated to protect the public interest and the equities of the contractor.

"(b) The Administrator or his designee may, whenever the contract provides for the vesting of title to an invention in the United States, waive the rights of the United States to such invention on such terms and conditions as he determines to be in the best interest of the United States: *Provided,* That any such waiver shall be subject to the reservation of an irrevocable, nonexclusive, nontransferable, royalty-free license for the practice of such invention throughout the world by or on behalf of the United States or any foreign government pursuant to any treaty or agreement with the United States.

"(c) The Administrator may waive, upon the same terms as provided in subsection (b) of this section, all or any part of the rights of the United States to inventions made in the performance of any work under any contract heretofore entered into by or for the Administration which have become the exclusive property of the United States. Any contract heretofore entered into by or for the Administration, on which final payment has not been made, may be amended without consideration to effectuate the purposes of this section: *Provided,* That no such amendment shall affect the status of inventions which have become the exclusive property of the United States.

"(d) The Administration shall be considered a defense agency of the United States for the purpose of chapter 17 of title 35 of the United States Code."

All together the subcommittee received testimony from some 40 witnesses and sought to obtain all possible points of view in order to assure a complete record on the subject. The subcommittee agreed to leave the record open for an additional 2 weeks in order to accommodate those who could not appear but who might wish to file statements.

Witnesses appeared before the subcommittee in the following order: Mr. John A. Johnson, General Counsel, National Aeronautics and

Space Administration; Mr. Gerald O'Brien, Assistant General Counsel for Patent Matters, National Aeronautics and Space Administration; Mr. Robert C. Watson, Commissioner, U.S. Patent Office, Department of Commerce; Mr. John C. Green, Director, Office of Technical Services, Department of Commerce, and Executive Director, National Inventors Council; Mr. Roland Anderson, Chief of Patent Section, Atomic Energy Commission; Dr. Alan T. Waterman, Director, National Science Foundation (accompanied by: Mr. William J. Hoff, General Counsel and Mr. Charles B. Ruttenberg, Deputy General Counsel); Mr. James P. Falvey, Deputy Assistant Secretary of Defense (Supply and Logistics); accompanied by Mr. G. C. Bannerman, Director, Office of Procurement Policy; Mr. H. C. H. Williamson, Office of Procurement Policy; and Mr. R. Tenney Johnson, Office of General Counsel, all from the Department of Defense; Lt. Col. Willard Hodges, Chief of Patents, Judge Advocate General's Office, USA; Mr. James P. Burns, chairman of the government patent policy study committee of the National Council of Patent Law Associations; Mr. Charles L. Shelton, patent counsel of United Aircraft Corp., East Hartford, Conn., representing Aerospace Industries Association; Mr. William R. Lane, patent counsel, North American Aviation Inc.; Mr. William Robertson, patent administrator, Chance Vought Aircraft, Inc.; Mr. Charles W. Leinbach, Jr., corporation counsel for Garrett Corp., Los Angeles, Calif.; Prof. Seymour Melman, associate professor of industrial and management engineering, Columbia University; Mr. Roger B. McCormick, Hartford, Conn., representing the Connecticut Patent Law Association; Mr. Harvey W. Edelblute, Riverside, Conn., president, Connecticut Patent Law Association; Mr. Elmer J. Gorn, chairman of the Electronic Industries Association patents and copyrights committee; Mr. John T. Love, chairman, section of patent, trademark, and copyright law, American Bar Association; the testimony of Mr. John W. Anderson, President, National Patent Council, presented by Mr. Fritz Lanham; Mr. J. R. L. Johnson, Jr., vice president, Hercules Powder Co., Wilmington, Del.; Mr. Paul L. Tillson, of the patent department of Gulf Cos., representing Pittsburgh Patent Law Association; Mr. A. L. Lyman, president, California Research Corp.; Mr. Alfred H. Rosen, representing the Boston Patent Law Association; Mr. Richard Whiting, vice president, American Patent Law Association; Mr. J. King Harness, representing Automobile Manufacturers Association and the Michigan Patent Law Association; Mr. Thomas M. Ferrill, Jr., chairman of National Association of Manufacturers' patents astronautics subcommittee; Mr. John Kenneth Wise, representing the Patent Law Association of Chicago; Mr. Louis Robertson, of Jones, Darbo & Robertson, Chicago, Ill.; Mr. William H. Davis, representing the New York City Bar Association; Mr. Robert R. Lent, chairman of patents and proprietory rights committee, Strategic Industries Association; Mr. Elwin A. Andrus and Mr. Kimball S. Wyman, Milwaukee Patent Law Association; Mr. Floyd H. Crews, New York Patent Law Association; and Mr. Harry C. Page, Cleveland Patent Law Association.

(8)

PART II—SUMMARY OF TESTIMONY

The testimony of 40 witnesses representing 6 departments and agencies of the executive branch of the Government; the electronic, aeronautic, astronautic, chemical, and other industries; the bar; and a university professor was taken in the course of subcommittee hearings. Most of the witnesses presented prepared studies, some including affirmative proposals for change in the patent provisions of the National Aeronautics and Space Act of 1958 and some including a proposed statement of congressional intent.

Statements were made by representatives of the National Aeronautics and Space Administration, the Department of Defense, the National Science Foundation, the Atomic Energy Commission, the Patent Office, and the Commerce Department.

Industry representatives included Strategic Industries Association, Electronics Industries Association, Aerospace Industries Association, Automobile Manufacturers Association, and the National Association of Manufacturers. In addition, there was representation on behalf of individual companies including North American Aviation, Inc., Garrett Corp., California Research Corp., and Hercules Powder Co. Although they did not speak on behalf of the respective companies, there was included among those present personnel from International Electronics Research Corp., Gulf Oil Co., United Aircraft Corp., and Chance Vought Aircraft, Inc.

A statement of Mr. John W. Anderson, president of the National Patent Council (a nonprofit educational organization of smaller manufacturers, inventors, researchers, and other professional groups devoted to the field of science and invention), was presented by Hon. Fritz Lanham.

Bar associations of national, regional, and local character were represented, including the American Bar Association, the American Patent Law Association, the National Council of Patent Law Associations, the Connecticut Patent Law Association, the Boston Patent Law Association, the Pittsburgh Patent Law Association, the Cleveland Patent Law Association, the New York Patent Law Association, the Milwaukee Patent Law Association, the Association of the Bar of the City of New York, the Chicago Bar Association, the Patent Law Association of Chicago, and the Michigan Patent Law Association.

Individuals who testified included an associate professor of industrial and management engineering of Columbia University, a lawyer engaged in the private practice of patent law in Chicago, and a statement in the form of a letter from a patent attorney who has been practicing for 21 years in New York and Salt Lake City.

More than a score of statements were filed with the committee by parties who did not appear in person, including informational data requested by the subcommittee from patent experts in the Departments of Agriculture, Commerce, Interior, and Health, Education, and Welfare.

Outline of Proposals for Change in Statute

The testimony of the witnesses overwhelmingly favored a change in the existing provisions of section 305 of the National Aeronautics and Space Act of 1958. The suggested changes ranged from deletion

of all reference to disposition of rights in inventions and patents (thus corresponding to the existing situation under which the Department of Defense promulgates its patent policy in its Armed Services Procurement Regulations), to retention of the existing provisions of the National Aeronautics and Space Act of 1958 (as exemplified by the Atomic Energy Act and the administration thereof by the Atomic Energy Commission). The preponderance of testimony, however, favored deletion of the present section 305 and substitution, in lieu thereof, of a provision by which the Government would receive a nonexclusive, royalty-free, nontransferable, nonrevocable license for governmental use. There was substantial testimony in support of the inclusion in the act of a statement of congressional intent with respect to title to and ownership of inventions and patents arising out of work done under Government research and development contracts, such testimony generally suggested the policy of allowing the contractor to retain title to the inventions and patents but requiring the contractor to grant a royalty-free, nonexclusive, nonrevocable license for governmental use of the inventions and patents arising out of such contracts.

There were also discussions between members of the subcommittee and the witnesses as to the desirability of setting forth in statutory form the conditions or criteria under which the Government should (1) take title to inventions or patents arising out of work done under Government contracts; or (2) merely acquire a royalty-free, nonexclusive, nonrevocable license for governmental purposes.

There was substantial unanimity among the witnesses as to the sypes of contracts or "other arrangements" in which the Government should not insist upon a royalty-free, nonexclusive, nonrevocable license for governmental use. These included contracts and agreements for the purchase of staple items of commerce or items developed by the contractor prior to receiving a Government contract for the supply of such items. As to such contracts the Government would not be granted any right to the inventions or patents utilized in making the articles other than the implied license to use which goes with the sale of the article itself to the Government.

As already stated, however, it was fairly well agreed that in those contracts or "other arrangements" pursuant to which research and development work is contemplated, the contractor, its employees, or subcontractors should normally retain title to the inventions and patents arising therefrom, but the Government should receive a nonexclusive, royalty-free, nonrevocable license to use any such inventions or patents. While some of the witnesses stated that they prefer that a requirement for granting of a royalty-free, nonexclusive, nonrevocable license to the Government in the latter type of contracts should not be incorporated in the statute, a large majority not only approved of the incorporation of such a provision in the statute but, in fact, many of them affirmatively recommended it.

There did not seem to be clearly defined categories of circumstances under which it should be incumbent upon the Government to take the entire right, title, and interest in and to the inventions or patents. Possible exceptions were: (1) in cases where other Federal statutes require it; (2) in order to avoid inequities among contractors; (3) where the inventions are made by Government employees who are hired specifically to do research and development work, in

Government-owned facilities, and wholly with Government funds. Even in this category of cases, it was mentioned by some that retention of the commercial rights by the Government employee-inventor constituted an inducement to highly qualified scientists to work for the Government at salaries which would be much less than if they were required to surrender all rights to their inventions to the Government.

Inasmuch as the atomic energy technology was originally developed with Government funds, was a Government monopoly at the outset, and commercial utilization of inventions in this field was controlled by statute, the arguments in favor of the Government ownership of inventions in that field came within the latter exception. While it was only incidentally germane to the subcommittee's inquiry, some witnesses asserted that such a condition no longer exists in the atomic energy field and that the Atomic Energy Act should be amended to leave title to inventions made in connection with contracts or other arrangements with the Atomic Energy Commission in the contractor.

The NASA Proposal

The National Aeronautics and Space Administration proposes that the existing section 305 of the National Aeronautics and Space Act of 1958 be repealed and that there be enacted in its place a new section 305 which would read as follows:

SEC. 305. (a) Each contract or other arrangement entered into by the Administration, and each subcontract at all tiers thereunder, which has as one of its purposes the performance of experimental, developmental, or research work, shall contain provisions prescribed by the Administrator governing the disposition of the rights to inventions conceived or first actually reduced to practice thereunder in a manner calculated to protect the public interest and the equities of the contractor.

(b) The Administrator or his designee may, whenever the contract provides for the vesting of title to an invention in the United States, waive the rights of the United States to such invention on such terms and conditions as he determines to be in the best interest of the United States: *Provided*, That any such waiver shall be subject to the reservation of an irrevocable, nonexclusive, nontransferable, royalty-free license for the practice of such invention throughout the world by or on behalf of the United States or any foreign government pursuant to any treaty or agreement with the United States.

(c) The Administrator may waive, upon the same terms as provided in subsection (b) of this section, all or any part of the rights of the United States to inventions made in the performance of any work under any contract heretofore entered into by or for the Administration which have become the exclusive property of the United States. Any contract heretofore entered into by or for the Administration, on which final payment has not been made, may be amended without consideration to effectuate the purposes of this section: *Provided*, That no such amendment shall affect the status of inventions which have become the exclusive property of the United States.

(d) The Administration shall be considered a defense agency of the United States for the purpose of chapter 17 of title 35 of the United States Code.

The Department of Defense endorsed and recommended enactment of the foregoing provision.

The EIA Proposal

The Electronic Industries Association recommends the enactment of a substitute provision for section 305 which would read as follows:

ELECTRONIC INDUSTRIES ASSOCIATION SPONSORED BILL TO RESTORE PATENT INCENTIVES TO THE SPACE ACT OF 1958

To effectuate the principles contained in the "Industry Statement on Property Rights in Inventions Under the National Aeronautics and Space Act of 1958" industry offers the following proposed bill:

A Bill To amend the National Aeronautics and Space Act of 1958 in order to foster and promote research in the aeronautical and space sciences.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 305 of the National Aeronautics and Space Act of 1958 is amended to read as follows:

"SEC. 305. Whenever any invention, improvement or discovery is conceived or first actually reduced to practice either—

(i) in the performance of any experimental, developmental or research work called for or required by any contract with the Administrator or any subcontract thereunder, or

(ii) in the performance of any experimental, developmental or research work done upon an understanding in writing that such contract or subcontract would be awarded,

the United States Government shall have an irrevocable, nonexclusive, nontransferable, royalty-free license to practice or cause to be practiced by or for the United States Government such invention, improvement or discovery: *Provided, however*, That where the inventor or his assignee elects not to file a patent application on any such invention, improvement or discovery, the Government shall have the right to file a patent application thereon, and the inventor or his assignee shall convey to the Government the entire right, title and interest in such invention, improvement or discovery, subject to the retention of at least a nonexclusive, royalty-free license by the inventor or his assignee: *Provided further*, That no contractor or subcontractor shall be precluded from negotiating with the Administrator with respect to the exclusion from the provisions of this section of inventions, improvements, and discoveries conceived but not actually reduced to practice prior to the work referred to in this section."

The National Patent Council Proposal

The statement of John W. Anderson on behalf of the National Patent Council included a recommendation that the following provisions be adopted to replace existing sections 305 and 306 of the Space Act:

SEC. 305. (a) Whenever any invention, improvement, or discovery is conceived or first reduced to practice either—

(i) in the performance of any experimental, developmental, or research work called for or required by any contract with the Administrator, or any subcontract thereunder, or

(ii) in the performance of any experimental, developmental, or research work done upon an understanding in writing that such contract or subcontract would be awarded,

the United States Government shall have an irrevocable, nonexclusive, nonassignable, royalty-free license to practice, or cause to be practiced, solely for United States Government uses, such invention, improvement, or discovery.

(b) The Government shall forthwith disclaim any and all rights to inventions and patents previously assigned to Government according to the provisions of this Act, except the nonexclusive rights herein provided to be received by Government. Rights so disclaimed shall revert to the assignors thereof to Government, and resultant damages to others, if any, shall be payable by Government.

(c) The Administrator shall promulgate such regulations as are necessary and appropriate to confirm to the United States Government, Government contractors, inventors, and patent owners, respectively, the rights provided by this Section.

The Pittsburgh Patent Law Association Proposal

The Pittsburgh Patent Law Association recommends substitution for section 305 of the Space Act of a provision corresponding to that of the National Science Foundation Act of 1950 which is as follows:

The National Science Foundation Act of 1950

(64 Stat. 154, 42 U.S.C. § 1871)

The provisions which control the patent policies are—

(a) Each contract or other arrangement executed pursuant to this chapter which relates to scientific research shall contain provisions governing the disposition of inventions produced thereunder in a manner calculated to protect the public interest and the equities of the individual or organization with which the contract or other arrangement is executed. * * *

(b) No officer or employee of the Foundation shall acquire, retain, or transfer any rights, under the patent laws of the United States, or otherwise, in any invention which he may make or produce in connection with performing his assigned activities and which is directly related to the subject matter thereof. * * *

The American Patent Law Association Proposal

The American Patent Law Association proposes replacement of section 305 of the Space Act with the following provision:

Sec. 305. (a) Whenever any invention, improvement or discovery is conceived or first reduced to practice either—

(i) in the performance of any experimental, developmental or research work called for or required by any contract with the Administrator or any subcontract thereunder, or

(ii) in the performance of any experimental, developmental or research work done upon an understanding in writing that such contract or subcontract would be awarded,

the United States Government shall have an irrevocable, nonexclusive, nontransferable, royalty-free license to practice or cause to be practiced by or for the United States Government such invention, improvement or discovery: *Provided, however,* That where the inventor or his assignee elects not to file a patent application on any such invention, improvement or discovery the Government shall have the right to file a patent application thereon and the inventor or his assignee shall convey to the Government the entire right, title and interest in such invention, improvement or discovery, subject to the retention of a nonexclusive royalty-free license by the inventor or his assignee.

(b) The Administrator shall promulgate regulations as are necessary and appropriate to confirm to the United States Government the rights provided by this Section.

The foregoing provision is substantially like that proposed by the National Patent Council but differs therefrom to the extent that the latter provision allows for the assignment of the entire right, title, and interest in certain inventions, improvements, or discoveries to the Government, subject to retention of a nonexclusive, royalty-free license to the inventor or his assignee.

Other Proposals

The National Association of Manufacturers recommends that section 305 be deleted from the present act and in lieu thereof there be inserted a patent provision corresponding to that found in the National Science Foundation Act of 1950 which has been quoted above.

The Strategic Industries Association recommends deletion of section 305 and in lieu thereof the insertion of a section which would

govern the disposition of inventions produced under contracts or other arrangements entered into by the National Aeronautics and Space Administration "in a manner calculated to protect Government interest and the equities of the individual or organization with which the contract or other arrangement is entered into." The witness testifying on behalf of this association points out that this is the substance of the language of the National Science Foundation Act of 1950.

The Cleveland Patent Law Association recommends deletion of section 305 of the present act and proposes to substitute in lieu thereof a provision corresponding exactly with that proposed by the American Patent Law Association and quoted above.

The American Bar Association, while disapproving specifically the existing provisions of the National Aeronautics and Space Act of 1958 relating to rights in inventions and patents sets forth its proposal for change in terms of a statement of general policy and objective. The resolution adopted by the American Bar Association reads as follows:

Resolved, That the American Bar Association approves the retention by a contractor of full title to all patent rights arising out of research or development contracts sponsored primarily for governmental use by any Government department, agency or the like, subject only to a royalty-free, nonexclusive license to the Government for governmental purposes, but not to enable the Government to furnish services and supplies to the public in competition with a contractor and its licensees; and be it further

Resolved, That the American Bar Association specifically disapproves those provisions of the National Aeronautics and Space Law of 1958 relating to such patent rights.

Speaking on behalf of the committee on patents of the Association of the Bar of the City of New York, Hon. William H. Davis quoted the following resolution of his association with respect to disposition of rights in inventions arising out of contracts or other arrangements with the National Aeronautics and Space Administration:

Resolved, That the interests of the United States would be best served if the contractor would retain title to all inventions made under the National Aeronautics and Space Act of 1958 and the Administrator retain for the Government only a nonexclusive, royalty-free license.

Mr. Davis also presented a suggested declaration of policy to be used as a statement of congressional intent. The proposed statement reads as follows:

SUGGESTED DECLARATION OF POLICY

Recognizing that the monopoly right to exclude others from the use of an invention for a limited term granted under our patent law is a right that has never heretofore been exercised by the United States to authorize the use of the invention by a particular individual or corporation to the exclusion of other citizens and that it is not a right apt to be used in that way, and further recognizing that this monopoly right to exclude is in private ownership apt to promote the progress of a useful art and specifically of aeronautical and space activities and to encourage the development of the invention to the point of practical application earlier than would otherwise be the case, and that there are substantial equities justifying the retention of this private right in the invention by the inventor or his assignee; it is the policy of this act to vest that monopoly right to exclude in the inventor or his assignee subject only to such conditions as, in a particular case, may clearly and peculiarly require that the monopoly right to exclude, or some part of it, be retained by the United States.

While many of the other witnesses indicated that a statement of congressional intent would be desirable and helpful, the foregoing text is the only prepared statement of such policy that was expressed.

Economic and Practical Effect of Government Ownership of Title to Inventions and Patents

Repeatedly the witnesses called attention to article I, section 8, of the Constitution of the United States, which provides:

> The Congress shall have power * * * to promote the progress of science and useful arts by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries.

In support of the proposition that it is only by exercising the right of excluding others from practicing the patented inventions that the patent system continues to stimulate and promote the progress of science and the useful arts, it was brought out by witnesses from the executive branch of the Government, as well as those outside the Government, that the Government has never been known to bring a suit for infringement on a patent to which it holds title. It was brought out that the Government does not issue licenses on a royalty-bearing basis under the patents to which it holds title. Even in those cases where the Government acquired title to patents through seizure during World War II under the Trading With the Enemy Act, licenses were not issued on a royalty-bearing basis. In any event, the testimony of most witnesses was to the effect that even if the Government adopted a policy of issuing licenses on a royalty-bearing basis, it is unlikely that it would issue any exclusive licenses. To do so, it was contended, would not only put the Government in business but would also place the Government in the position of favoring one of its citizens to the exclusion of another.

Thus it was argued that to the extent that there is no enforcement of the patent right and no exclusive rights are granted thereunder by the Government where it holds title to the inventions and patents thereon, the incentive of private industry to commercialize the inventions for nongovernmental use is destroyed or at least seriously impaired. Moreover, it was urged that present Government policy encourages some concerns to wait until another company has developed a commercially salable product and thereafter enter into competition with the original inventor or developer with respect to the non-Government commercial market. In other words, Government ownership allegedly encourages some to reap where they have not sown.

One witness characterized the Government policy of acquiring the entire right, title, and interest to inventions as "killing the goose that laid the golden egg." This analogy was applied to suggest that by making the invention freely available to all comers or by failing to enforce the patent against infringers, the patent right becomes a nullity. Thus it not only stifles further effort to improve upon and avoid the patent but also stifles competition since the exclusivity afforded by a patent is fundamental to competition under the American patent system and the free enterprise economy in which the patent system is intended to operate.

Contrasts were drawn between the American patent system and its operation, on the one hand, and the Soviet patent system and its method of operation, on the other. The argument goes about as follows: Whereas the American patent system depends upon free and open competition for commercial markets, the Soviet system depends upon a determination by the Government as to the economic or commercial necessity of producing an article as a basis for its indus-

trial operation. There is some similarity between the so-called patents of the Soviet system and the wording of sections 305 and 306 of the National Aeronautics and Space Act of 1958 (which are substantially the same as patent and compensation or award provisions of the Atomic Energy Act). The Government ownership provisions of the NASA and AEC statutes, if carried out literally, would correspond to the "public patents" provision of the Soviet system in that there can be no private commercialization of the inventions without Government approval. The "compensation or award" provision of the NASA and AEC statutes correspond to the "private patent" provisions of the Russian system in that the inventor will not be rewarded unless the Government allows commercialization or use of the invention in the interest of the public.

Effect of Government Ownership of Inventions and Patents on Small Business

Frequent references were made by the witnesses to the adverse effect of Government ownership of inventions and patents on small businesses. It was argued, for example, that one of the most advantageous ways for small business to compete successfully against larger competitors is by allowing small businesses to retain ownership of the commercial rights in their inventions and patents whereby they will have the ability to exclude larger competitors from a limited field under such patent rights. Although small businesses as well as large businesses would normally expect to grant the Government a royalty-free, nonexclusive license to use, for Government purposes, any inventions made during the performance of a Government research and development contract, the smaller business would stand to gain more than the larger one since the economic strength of the latter may be sufficient without patent protection whereas the former are aided by and derive economic strength from the rights afforded by the patent system.

Inasmuch as the National Aeronautics and Space Administration requires a large number of small components from various segments of industry, the smaller electronic businesses and smaller research and development concerns are frequently directly affected by the patent policies of the agency. Strong objections to the NASA patent policy have been voiced by many small businesses. They assert that they are willing to do everything necessary to support the needs of the Government and may even find Government business profitable. However, if the Government patent policy deprives them of an exclusive position in the commercial market, they indicate reluctance to accept the Government contracts since their know-how and exclusive position will be made available to their competitors, both large and small, and thereby defeat their existence in the free enterprise system.

Since the field of atomic energy is highly specialized and hazardous, small businesses are not so likely to be involved in the contracting procedures of the Atomic Energy Commission. However, NASA frequently draws upon small industry. It is argued, therefore, that the objectives of the Atomic Energy Act and the mode of attaining them are not necessarily the same as those of the Space Act.

All businesses enjoy the opportunity to supply Government needs as to patented components by their immunity to suit under the act

of 1910. Thus it is not possible for direct competitors in other small businesses or even the larger competitors to preclude small business from obtaining Government contracts to manufacture end items, whether patented or not. On the other hand, it is urged that if a small enterprise is engaged to do research and development work for the Government, there is no assurance that it will receive a fair share of contracts for procurement of the end items which it has developed. Neither will it be in a position to strengthen its own economic condition and subsequent value to the Government by exploiting its inventions in the commercial market. In short, it will exist only so long as it holds Government contracts and the technology it has developed will not reach the public economy through commercial exploitation.

It was pointed out during testimony that, contrary to the impressions held by some, a large percentage of the important inventions are made by individual inventors rather than by research "teams." Inasmuch as small businesses do not ordinarily operate research teams, but usually utilize individual inventive talent to carry on their research work, it is held unlikely that large corporations will monopolize inventive developments which result from Government financial research and development contracts.

Certain types of research such as that involving atomic energy may best be performed by large well-established organizations equipped with expensive and highly technical equipment and instrumentation. The small, intricate, and complex control systems for space vehicles, however, are often made up of commercially available elements and particularly lend themselves to development in a small workshop in the hands of individual technicians. Moreover, the substantial amount of subcontracting of components which is ordinarily done in missile or space procurement, decreases the likelihood that any one contractor or business will dominate, by its inventions or patents, the entire end item. By diversifying the research and procurement of the components, it is asserted, a larger number of inventive minds are put to work on improving the individual features of the end item and thus a better product is produced for the government.

Government Ownership of Foreign Rights

The testimony of John C. Green, Director of the Office of Technical Services, Department of Commerce, brought out the fact that the Government has not exercised rights heretofore acquired to obtain patents in foreign countries on inventions to which it has taken title under Government contracts. It has been suggested from time to time that U.S. Government ownership of the foreign right would place the U.S. Government in a position to bargain with foreign governments with respect to the right of the United States to use inventions made by foreigners and patented in foreign countries or the United States. The necessity for obtaining title to the patents and inventions in question, however, has reportedly been largely eliminated by the NATO status of forces agreements and similar agreements between the United States and foreign countries. Pursuant to those agreements, the respective governments are insured access to foreign inventions by way of patent exchange clauses.

Several efforts, it was testified, were made to encourage industry to underwrite the cost of obtaining foreign patents on U.S. Government-

owned inventions in exchange for a royalty-free, nonexclusive license under any foreign patents thus obtained. These efforts proved to be unsuccessful for the reason that the commercial concerns required some degree of exclusivity as a prerequisite to investing the funds necessary to obtain the patents. Moreover, it appeared that merely obtaining foreign patents would not afford any economic benefit since the patents are valueless unless the inventions are practiced in the countries in which the patents are obtained. Commercial concerns were reluctant to practice the patented inventions in foreign countries unless they could be assured of an exclusive license and the U.S. Government declined to grant exclusive privileges.

If the commercial rights are retained by the contractors they will also be in a position to file applications for patents in foreign countries. In this way it is alleged that the contractor will possess an exclusive right which will encourage him to commercialize the inventions in foreign countries as well as the United States and thereby strengthen the economy of both the foreign countries and the United States.

Comparison of Government Contribution With Contribution of Contractor

There is little in the record of the hearings to indicate that it is necessary for the Government to underwrite the development of a totally new field of technology in its implementation of the National Aeronautics and Space Act of 1958. Rather, it appears from the testimony that the National Aeronautics and Space Administration took over—for the most part—existing contracts and certain research activities which were already started under the direction of various agencies of the executive branch both within and outside the Department of Defense. The origin of the Space Agency thus differed from the origin of the Atomic Energy Commission. The latter was an outgrowth of the Manhattan project which was basically under the direction of the Army Engineers.

The basic research upon which the Manhattan project was founded had been done primarily in Europe by Einstein, Fermi, Meitner, Bohr, Curie, and others. The Manhattan project and, later, the Atomic Energy Commission, drew upon large numbers of people in the academic community to carry forward some of the basic atomic energy research to the point where it passed into the realm of applied research, and later into development work. When the problem of management and operation of the Government-owned facilities grew to larger proportions and the development aspects became more important, the experience and know-how of the management of large corporations such as General Electric and Du Pont were drawn upon to carry forward the work initiated and sponsored by the Government.

The work of the National Aeronautics and Space Administration, on the other hand, did not begin as a Government monopoly but was an outgrowth of advances in technology in the science of ballistics, aeronautics, and electronics. There was already a wealth of experience and background in the hands of private enterprise and of which the Government availed itself as a consequence of the advance of technology in the field of rocketry and missiles.

Whereas the inventions upon which atomic energy developments are based were made within the last 20 years or so, the inventions of

the Wright brothers and Marconi constitute much of the basis for the applied technology in the field of activity of NASA. Long before the Government went into the development of space vehicles, many companies were engaged in the development and manufacture of aircraft, computer, fuel, and communication devices, and it was toward such established laboratories or growing concerns that the Government turned immediately in its decision to explore outer space. Some companies took Government research and development contracts on a cost basis to aid in the national effort, which required them to divert time and energy from their normal business of manufacturing and developing goods for use by the civilian economy.

The private enterprise argument proceeds further along these lines:

It is through purchases made by commercial consumers that research companies are able to build and staff their laboratories and put money into research and development programs to provide better and cheaper products for the Government as well as the consuming public.

Hence the Department of Defense patent policy of procuring only that which the department itself needs—namely, the finished end items—is doubly beneficial. For if, as a consequence of retention of the commercial rights in inventions arising out of contracts with the Department of Defense, the contractor is encouraged to sell the same item or another item embodying the same invention, there will be a substantial addition to the gross national product and, to that extent, the taxpayers' money will have been well invested.

Where the contractor with whom the Government deals already has an established research laboratory and a growing business, it is held unfair for the Government to expect that contractor to agree to surrender title to any new inventions that are made, since it cannot be said that those inventions are attributable entirely to the recent Government financing. The inventions may represent a culmination of many long years of experience of the research workers, and a solution to the problem may have been inspired by a commercial need of the contractor. Under these conditions it is urged that the contracting authority for the Government should have the power to negotiate a contract on terms which will be most equitable both to the Government and to the contractor. Regardless of prior equity in an invention, witnesses did not generally display any reluctance to grant the Government a royalty-free, nonexclusive license for governmental use.

Administrative Difficulties Imposed on NASA

The hearings emphasized that the wording of the National Aeronautics and Space Act of 1958 places the Administrator under the burden of showing that it is in the national interest to waive any part of the Government's rights to inventions made during the course of work under a Government contract—whereas, a less severe test would be imposed if the Administrator is permitted to prescribe by regulation the various terms and conditions governing disposition of rights to inventions made during the course of work under a NASA contract. Since such regulations would carry the force and effect of law and since the Administrator is charged with the responsibility of carrying out his duties in the national interest, it is argued that in the latter instance

the equities of the Government will be protected while, at the same time, allowing the contractor the commercial fruits of the inventions which might arise from such contract.

Concern was expressed over the literal interpretation which might be given by some Administrator to the present provisions of the Space Act of 1958 in connection with contracts for the procurement of ordinary items where the contractor may have made an invention in producing the item in a more efficient form and perhaps at a lower price. That is, section 305 might be interpreted so as to treat the fulfillment of the contract as "the performance of work" under a contract with the Administration and thus conclude that the invention is "related to the contract." As an example, NASA officials postulated this case: Suppose NASA contracted for the development of a fuel tank for liquid hydrogen and in performing the welding of the fuel tank, the welder, as a nonresearch employee, invented a welding rod holder which is used in the performance of the work under the contract for the tanks. In that case it would follow that the Government would assert title to the invention, and it would be incumbent upon the Administrator to determine whether it would be in the interest of the United States to waive any or all of the Government rights in the invention before the contractor or employee would be allowed to secure a patent on the welding rod holder.

The majority opinion was that the terms and conditions under which the rights to inventions and patents are to be disposed of should not be specified in a statute but should be left primarily to the discretion of the Administrator.

Another concern leading to the same conclusion was that while NASA patent regulations under the current Administration are "liberal" insofar as they exempt various types of contracts entered into by the Space Agency, the language of the present law is susceptible of much more stringent interpretation. Some future Administration, therefore, might feel obliged to interpret the law more literally and thereby greatly increase the amount of administrative redtape to be dealt with in furthering the national space program.

Divergent Views

Three witnesses presented the subcommittee with views either markedly or partially at variance with the general line of reasoning expressed in the foregoing summary.

The Government witness who did so was Roland A. Anderson, Assistant General Counsel for Patents of the Atomic Energy Commission. His position is set forth in the following testimony:

> It is the Commission's view that where the Commission sponsors and pays for research and development in the field of atomic energy, the resultant inventions and discoveries should be the property of the Government for the benefit, not only of the particular contractor, but of the general public. This policy of the acquisition of all rights in inventions and discoveries in the atomic energy field, together with a corollary technical data provision under which the Commission acquires rights in the data to use the same as it sees fit, has permitted the Commission and the Government generally complete freedom of action as respects the dissemination of scientific and technological atomic energy information prepared and developed under Commission contracts to the entire public in the public interest and not just to contractors and other selected groups. The Commission's ownership of the rights in the discoveries and inventions in the atomic energy field has avoided the granting of special privileges and the establishment of preferred positions by its contractors.

One of the present effects of the AEC patent policy is that all unclassified and declassified technological and scientific information prepared and developed by the Commission and its contractors is available to every company presently engaged in atomic energy work. Everyone is entitled to use the scientific and technical data and the inventions and discoveries that have resulted from Commission contracts. This utilization of technology would not be possible under a program that provided only for royalty free use by the Government.

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I feel that in the field of patents, and I have always felt this, that there is a balance of public interest and equity. There may be situations which would warrant the Government only acquiring a nonexclusive license. There may be other situations where it would warrant the Government taking the entire right, title, and interest. The difference and the basis for that is that where the Government, as in the atomic energy field, was the sole sponsor in the early days, and there was no question of going into a phase of work where there was an industrial position. I think the Government was justified in taking and acquiring all rights in the inventions.

I think, for example, in connection with such departments as the Department of Agriculture, and I believe their policy is of the character where they try to acquire in their research and development work greater rights than a nonexclusive right for the Government—they may only require a nonexclusive license with the right to grant sublicenses to anyone. But in the Department of Agriculture, I think again it is a situation where if the public is to benefit and they let a contract for research and development work, we will say, to develop a new fodder for cattle, or feed, and then they give that contractor the exclusive right except as against the Government, the benefit that the public is to get out of that may be very little. And consequently in that kind of a situation they may be justified in requiring the contractor to license everyone or to acquire all the rights for the benefit of the Government.

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For a further example, take the Defense Department. If they go to a manufacturer of gears and say "We would like you to do some research on gears to develop a little bit better gear because we want a stronger gear," the Government may be perfectly justified in only taking a nonexclusive license. The Government is not in the manufacture of gears. The manufacturer is. Therefore, the public interest may be perfectly protected. On the other hand, in the field of atomic energy today, it is unique; you can't operate a facility without a license, you can't do anything in the technical field of nuclear energy without some sort of a permit from the Commission. Further, the large bulk of the research is still being Government sponsored research work.

Further, you have the provision in our act which says that we must disseminate the scientific and technical information to the general public, subject to security requirements. And if you have that obligation, as I mentioned in my prepared statement, we have a provision which we acquire the rights and in the technical data developed so that we can disseminate it. Now you can't acquire only a nonexclusive license and be in a position to disseminate that information. Some say "Why can't you?" Well, if you have only a nonexclusive license and the contractor has the right to file patent applications, he doesn't want you to disseminate that information until he, if nothing else, has filed his foreign applications. If you publish before he files a U.S. application, he will be barred from filing any foreign applications.

Now, if he files his U.S. application first and then you publish, he has a year within which to file, if it is a convention country. On the other hand, it may be a nonconvention country, and the contractor will say "I don't want you to disseminate this kind of information until I file in all the countries of the world," if he wants to be that kind of a contractor.

* * * if we believe in the fact that by disseminating the information you get a better all-around viewpoint, then under the theory of the Atomic Energy Act that information must be made available to everyone. If you are going to make the information available to them and you are not going to let them use the inventions because you only acquire a nonexclusive license for governmental purposes, you might not be fulfilling the intent of the Congress insofar as the Atomic Energy Act is concerned.

A second witness who held different concepts of the patent property right as related to the effectiveness of research was Prof. Seymour

Melman, associate professor of industrial and management engineering, Columbia University. The gist of Professor Melman's thesis as given the subcommittee was as follows:

The exploration of space, which is the central objective toward which these hearings are held, requires the collaborative development of all of the physical sciences. Clearly, the problem of how this development is furthered is a many-sided problem.

In the monograph that I prepared for the [Senate] Subcommittee on Patents I dealt with one aspect of this matter and that is: What is the effect on the promotion of science and the useful arts that derives from treating knowledge as property?

In this study which examined the experience of large industrial laboratories and of nonindustrial laboratories, governmental and university, I made two principal findings: One, that there are clearly alternative ways of organizing research and disposing of knowledge. And, second, that the use of knowledge within the framework of property relations, on balance, has the effect of detracting from the most efficient pursuit of knowledge, and the most efficient pursuit of the new application of that knowledge.

Research in this inquiry was found to be a function of great division of labor, and this division of labor requires a maximum of free communication to operate efficiently. The treatment of knowledge within the framework of property relations, of which patenting is one possible mode of treatment, has the effect of placing barriers to communication and thereby restricts the pace of inquiry. Further, this investigation found that research proceeds on the basis of individual creativeness and teamwork, and the collaborative activity of people takes on an increasing importance as science develops. And this applies not only to pure science but also to work of application of design.

How can this be construed with respect to the broad problem of exploring the universe that we live in? The taking of property right to knowledge automatically subjects decisions on research and decisions about the applications of knowledge to the requirements of the owning agency, whatever that agency be.

Clearly, then, the wider the responsibility the more broadly gaged the criteria of the decisionmaking agency on the line of research and on the disposition of knowledge, the broader is the opportunity for the application of knowledge and for the development of new knowledge.

This study that was completed a year ago also dealt with the effects of ways of using knowledge on the conduct of research. Who is to decide upon research? That was found to be an important question that has bearing on the efficiency of the conduct of inquiry. Thus, the observation and inference there was that the closer the decisionmaking on research is to the investigator who performs the work, the more efficient is the pace of the production of new knowledge, and conversely, the more removed from the investigator, the more managerial, the more hierachical the decisionmaking over the conduct of inquiry, the more one may expect to find barriers in the pace of production of new knowledge.

The pace of inquiry is also affected by the criteria that are used for decision, the rules that are utilized as to what research shall be done and how that knowledge shall be utilized.

There it was found that where knowledge is treated—where the production of knowledge is treated as an end, in itself, the pace of inquiry moves the more rapidly, as against criteria which see the production of new knowledge from the vantage point of a special section or group or agency in society.

And, third, the pace of inquiry and its application is heavily affected by publication policy, by the way new knowledge and new design is diffused and made available in the scientific and in the technical community.

Here the inference was that free publication promotes the widest and the most rapid diffusion of knowledge, while restriction on publication has a converse effect.

Another way of examining the effect of these factors was found in situations where there was a change from the criteria and conditions of treating knowledge, the pursuit of knowledge as an end in its own right to a property control over knowledge. This occurred in numbers of universities where patenting provisions and practices were introduced as criteria for the conduct of inquiry, for the applications of knowledge. And these conditions which were explored in a number of universities of importance show that the direction of the effect of treating knowledge under property relations was rather firmly in the direction of restricting the pace of inquiry.

Further, an interesting observation was made in a major industrial laboratory and I venture to bring this to the attention of the body because of the importance

of that research group in size and standing in the technical community, in its own right.

The management of this laboratory had found that by far, a large majority of the new knowledge which, in fact, was patentable, which yielded patentable results, came from that section of its operations which was a minority section of the operations, in terms of personnel, but which was characterized by the condition of greater freedom of operation for these personnel. So even within the framework, you see, of laboratories that are guided, oriented by the criteria of a single firm, this differential efficiency in the conduct of inquiry and productiveness thereby was revealed.

Further, may I call the attention of this body to the point that the major asset for a whole society venturing to conduct the exploration of space is not found in the current or prevailing body of knowledge, but, more importantly, in the condition of the means of production of new knowledge. Hence, if the organizations that pursue the work of producing new knowledge and of venturing alternative possible applications of that knowledge and design are so organized as to maximize the efficiency of the process of inquiry and its application, then the society will get the greatest benefit from it, and that will be a most powerful factor in affecting the general pace of the development.

I mention that as against any possible sense of self-assurance that may come from a view of what seems to be a very substantial body of knowledge and a very substantial body of personnel producing knowledge in our society.

Next, it was found in this inquiry that it was fairly clear that the use of knowledge within the framework of property relations, for example under the patent system, was clearly a useful device for various firms, especially many of the larger firms who could advantageously trade in patents and otherwise make use of patent rights.

An attempt was made, somewhat speculative, but nonetheless interesting, to gage what might be the possible effect of the restriction or removal of the rights to take property and knowledge, if that were to occur in nonprofit institutions, universities, and government, and if that were to occur in industrial firms. And the finding there was that surely the nonprofit institutions would continue to conduct inquiry and pursue its application within the framework of the resources available, and that the industrial institutions would continue to conduct inquiry and would do so because of the requirement of the conduct of inquiry and the discovery of new knowledge and the application to new design that comes from trying to advance the competitive position of firms.

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A third witness who held differing views in regard to the effort to amend the Space Act was Chicago Attorney Louis Robertson, a patent lawyer. He told the subcommittee, in part:

* * * I think I am in the position of asking you gentlemen to save the patent system from its friends. What they want is in the right direction, but I think they want too much. I think it would hurt the patent system. I think that when monopoly power is given to a private individual, that monopoly power having been derived by Government-financed research, there is likely to be a great deal of criticism of the results.

One or two sad instances under that—one or two sad instances of the exercise of that monopoly power could bring great discredit upon the patent system. It perhaps shouldn't be blamed on the patent system, because it would be because of excesses under the patent system, but just as the patent system suffered at the hands of the courts in the thirties and thereabouts for the excesses which have since been taken off, so the patent system would then be blamed for the excesses.

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How far is it desirable to go in the direction which the patent lawyers have urged? Well, first of all, I think there should be, either by statute or by rigid ironclad regulation, a provision that any contractor whose employees make an invention will have a free right to use that invention, assuming of course that the employer has the assignment from his employees; that the Government, in other words, will not exclude him from the use of the invention developed under his research project or his other project—manufacturing project.

Now that alone would be quite a good deal of incentive to the manufacturers, because they would be in on the ground floor of the promotion of those things which they were thus insured the right to promote. I don't mean to say that it would always be enough. On the other hand, I think that rarely, if ever, is there

adequate reason to let the Government have a monopoly on the invention, of any kind. I think that if there is any provision retained for Government ownership of the monopoly part of the power, that that should be exercised under restrictions which would make it very difficult to exercise.

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I don't, however, believe that there are many times when the monopoly power to the private industry on something developed by the Government or at its expense is justified. And if it isn't justified, I think that the power to grant that power probably should not be in bureaucratic hands. There is too much danger that some of the administrators having that power would lack the constant desire and diligence necessary to keep it from being abused.

They would lack, for example, usually any particular desire to protect the patent system from criticism by its abuse. They would no doubt have the desire to protect the public, but they would be much more anxious, probably, to get the research done than they would be to go to the last ditch in protecting the public.

As far as getting the research done is concerned, it has been said quite a bit, I believe, that we should let the contractors have the patents because we want maximum incentives.

I question: Do we want, really, maximum incentives, unqualified? If we believed in maximum incentives, wouldn't we want 50-year patent systems, instead of 17; wouldn't we permit cost-plus-25-percent contracts? Obviously we don't believe fully in maximum incentives. We want adequate incentives. Perhaps we want incentives that would be the maximum that is permissible with the proper balance of other considerations. I am afraid that my patent colleagues tend to forget the other considerations.

I believe that it would be possible to take care of the situation in a way that would cause very little administrative trouble in the ordinary case, and I would like to see consideration given to a type of statute, or conceivably it could be done under the present statute by regulation, which would provide that in the situations where the invention was made entirely under the research contract, there would be no injunctions granted. In other words, there would not be quite the full monopoly power. In situations where the Government right to assert ownership under general principles of hiring the invention done were less strong, the granting of injunction would be discretionary.

Conceivably there might be a board provided for administratively assuring a particular contractor, if he showed a need for protection of an industry he wanted to start, which he wouldn't dare start without protection, there might then be a provision for giving him the protection, giving him the monopoly under those special circumstances, but not otherwise.

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In the case of the patent system, we are convinced it is thoroughly worthwhile, but that is a situation where the patentee is instigating what he does and is often taking great risks in doing it.

Surely, the same great valuable patent, which is justified under those conditions of a person who does all the instigating and takes all the risks, is not necessarily just for someone who does much less than that; perhaps does neither instigating nor taking risk.

It is true that the contractor often brings to these contracts great skill, great collections of experts, great know-how in his own field, and he is, perhaps, very well entitled to royalty, but that doesn't necessarily mean that he is entitled to the monopoly power. Personally, I would be inclined to go as far as to even permit the royalty to be reduced in accordance with the Government contribution to the development of the invention, and I don't believe that that would necessarily create a great deal of trouble. It wouldn't need to be determined administratively, at least not unless some party wanted it to be, and wouldn't even need to be determined during trials. It could be expressly provided that that provision for reduction of the royalties would not make anything admissible during the trial of a case prior to decision that would not have been admissible otherwise, but it would be an element that could be considered by the court later in determining what is a reasonable royalty under all the circumstances.

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PART III.—COMPARISON OF PATENT POLICIES NOT FIXED BY STATUTE OF VARIOUS GOVERNMENT AGENCIES

The inventions with which Government agencies deal fall in two general categories; namely, (*a*) those made by Government employees and (*b*) those made by contractors or parties in privity with contractors.

Executive Order 10096 provides a uniform policy for determining the disposition of rights to inventions made by Government employees whether such employees are hired for the purpose of doing research and development work or for duties other than research and development work. While the Executive order places the burden upon the employee to establish whatever rights he claims in the invention, in operation the Government does not assert title to inventions unless they are made by research and development employees. Even as to that category of employee, there is sufficient latitude given to negotiate the terms and conditions of employment, part of which may deal with disposition of rights to inventions made by the employee during the performance of his duties.

To the extent that Government employees hired to do research and development work are given continuous employment, and most employees in that category obtain some measure of employment security in their civil service ratings, their status with respect to the Government is similar to that of the employee hired by a private corporation to do research and development work.

The situation differs, however, when the Government contracts with someone outside the Government to do research and development work. The policies of the respective agencies of Government not heretofore covered (as to inventions made through R. & D. contracts) are generally consistent insofar as they require that the Government be given a royalty-free, irrevocable license to use the invention. Beyond this, policies vary both as to substance and methods of implementing them.

Here is a brief summary of some of the important policies in effect:

Department of Defense

The Department of Defense acquires no patent rights on contracts calling only for delivery of supplies. On research and development contracts the Department requires an irrevocable, royalty-free, nonexclusive license to make or have made any invention arising thereunder.

Department of the Interior

The present policy of the Department of Interior is to attempt to insure that such inventions shall be available to the public by having the patents assigned to the Government. When this cannot be done because of the contractor's refusal to accept an R. & D. contract with such clause, the exception to the general policy is that title will be left with the contractor, the Government to be granted a royalty-free, irrevocable license.

Department of Agriculture

Research and development contracts are authorized under the Research and Marketing Act, which requires that inventions resulting therefrom shall be made available to the public through dedication

or assignment to the Government. In the event assignment is taken, a royalty-free, nonexclusive license is thereupon made available for issuance to qualified persons.

Department of Commerce

Policy is that there shall be flexibility to allow negotiation as to whether the Government takes title or nonexclusive license. The majority of R. & D. contracts financed by the Maritime Administration, and these are of two general categories: (1) Entirely marine research. In this category the general policy is to reserve to the Government nonexclusive, irrevocable, royalty-free license. (2) Dealing with that research bearing on nuclear material or atomic energy. In this category the Maritime Administration follows the policy of the Atomic Energy Commission under the Atomic Energy Act of 1954, which authorizes three clauses: (*a*) Government retains sole power for determination and disposal of patent rights, contractor retaining no rights; (*b*) Government retains sole power for determination and disposal and the contractor is allowed at least a nonexclusive, irrevocable, royalty-free license; (*c*) Government retains sole power of determination and disposal but contractor is allowed to retain sole irrevocable, royalty-free license except as against the Government.

Department of Health, Education, and Welfare

Basic policy is that R. & D. contracts will reserve to the Government the right to determine the ownership and the disposition of any resulting invention. There are two exceptions to this basic policy. The first deals with nonprofit institutions where it is determined that the institution will make the inventions readily available without unreasonable restriction or excessive royalty. The contract may provide that the invention will be left to the institution with stipulations in the contract deemed necessary in the public interest. The second exception relates to cancer chemotherapy industrial research contracts, where the contractor may accept the standard patent clause which implements the general policy of the Department, reserving the right of disposition of inventions to the Surgeon General, or an alternative clause leaving the right to patent inventions with the contractor, subject to certain limitations deemed necessary to protect the public interest. The alternative must contain the provision that there is reserved to the Surgeon General the right to either dedicate the information to the public or to assure royalty-free, nonexclusive licenses, notwithstanding any patent which the contractor had heretofore obtained.

Post Office Department

The contractor is to grant to the Government irrevocable, royalty-free license. However, this is limited to the extent that the Government may not use the license in competition with the contractor or any of its commercial licensees. Although the Government's license is nonexclusive, it may give sublicenses to foreign governments but solely for use in those governments' mail-handling activities.

General Services Administration

The policy of GSA follows that of the Department of Defense in that GSA uses the contract clause established in section IX of the

Armed Services Procurement Regulations, whereby the Government receives royalty-free, nonexclusive license.

Veterans' Administration

Usual policy of the VA is to provide that the patents remain the property of the contractor, subject to nonexclusive, irrevocable, royalty-free license to the Government for use and manufacture of the invention for governmental purposes. The VA in addition usually acquires the right to reproduce and disclose technical information, drawings, designs, reports, and data pertinent to the invention.

Tennessee Valley Authority

TVA has broad powers to make contracts for R. & D. work; however, presently there are no contracts outstanding for R. & D. The TVA also has the right to issue grants to nonprofit organizations; however, no regulations for the issuance of such grants have yet been promulgated. TVA at present obtains all of its patents through inventions created by governmental employees. The basic law provides that inventions made by virtue of and incidental to employment by an employee shall be the property of the Government. The present policy of the agency is that it now allows title to inventions made by employees which are not "by virtue of and incidental to" the services of employment to remain in the inventor.

PART IV—FINDINGS AND RECOMMENDATIONS

In making its report and recommendations to the full committee, the Subcommittee on Patents and Scientific Inventions is not endeavoring to treat the Government-industry invention-ownership problem across the board. It is not attempting to discover and remedy all the problems which are involved with the ownership of inventions produced by private parties through contracts with the Government. It is not attempting to come to grips with all the fundamental issues which interlace the basic philosophies of our patent system and its operation.

Such matters are beyond the mission and scope of authority of the subcommittee.

The subcommittee has been considering one central point, as follows. What effect is the patent section of the National Aeronautics and Space Act of 1958 having upon the conduct of the overall U.S. space program? If that effect is adverse, to whatever degree, what should be done about it?

Obviously, in a study of this kind it was impossible not to treat in detail much of the basic philosophy and traditional concept of the American patent system. The subcommittee was, in fact, obliged to do this in order to approach its mission rationally. Nevertheless, the subcommittee's recommendations must be founded essentially upon the relationship between that part of the existing law which the Administration desires amended and the progress of our national space effort.

After a thorough review of the record and of the evidence accumulated in extensive hearings, the subcommittee has reached certain basic conclusions.

Conclusions

(1) The so-called patent provision (sec. 305) of the National Aeronautics and Space Act of 1958 is tending to complicate and retard the conduct of the American space program.

(2) The patent provision of the National Aeronautics and Space Act of 1958 should be amended along the lines recommended by the National Aeronautics and Space Administration, but with certain safeguards added to make doubly certain that the proper interests of the Government and the public are protected.

(3) A statement of congressional intent should be incorporated in the legislative history of the amendment in order to provide specific guidelines for its administration and, at the same time, sufficient flexibility to avoid hampering of the space program.

(4) Amendment of the patent section of the National Aeronautics and Space Act of 1958 should be accomplished at once, independently of such subsequent legislation as may be planned to standardize the patent policies of all Government agencies.

Effect of the Current Law

Research and development is the heart and soul of the space program and promises to remain so throughout the foreseeable future. Under the present law, however, the National Aeronautics and Space Administration is required to function under a statute and through regulations which make it difficult at times to achieve the research and development demanded by its program.

There are two prime reasons for this in the eyes of National Aeronautics and Space Administration officials who work with the patent clause. One is that the Space Administration must operate on principles which are at odds with those of the Department of Defense, taking title to inventions produced under its research and development contracts while the Department of Defense requires only a royalty-free, irrevocable license to use inventions produced through DOD research and development contracts. The second reason is because many private contractors are reluctant to enter into research contracts with the Space Administration unless they will be permitted to retain the right to commercial exploitation of such inventions as may result.

The first condition, the Space Administration alleges, results in considerable confusion and redtape since many avenues of NASA research follow the same lines as DOD research and frequently involve the same contractors at the same time. The second condition results in an inability to secure the best research for lowest cost and in the shortest time.

On the basis of its inquiry, the subcommittee finds that there is evidence to sustain the foregoing arguments. It is true that the evidence could be stronger than that which has been presented. On the other hand, the subcommittee recognizes that there are hard reasons why individual contractors do not wish to be classified as ones "holding out" on research efforts so vital to the Nation. To do so places management officials between the devil and the deep. They are responsible under the private enterprise system for operating a profitable business, yet if they decline Government business because it is unprofitable they become vulnerable to charges of lack of patriotism. American industry should not be placed in this awkward, often injurious, position.

Nevertheless, the subcommittee received sufficient evidence to convince it of the logic of the position taken by the National Aeronautics and Space Administration, a position broadly supported by other agencies of the Government, including the U.S. Patent Office, by industry and by the legal profession.

At the request of the subcommittee chairman, for example, the following concrete instances of difficulty encountered because of the patent section have been related by the National Aeronautics and Space Administration.

Case No. 1.—The Westinghouse Electric Corp. believes that they have made some very basic and fundamental discoveries in the technique of maintaining and regulating an arc discharge in a gaseous medium. The discoveries which Westinghouse Electric have made in connection with arc discharge resulted from their studies over the years of the phenomena of arc discharge. It appeared to technical representatives of Westinghouse Electric that these recent discoveries could well have application to the development of high-velocity wind tunnels capable of producing velocity of the order of Mach 15. Westinghouse Electric informally inquired of NASA whether or not a contract for research and development with NASA to apply their discoveries in the field of arc discharge to the development of a high Mach number wind tunnel would permit them to retain commercial rights in inventions made in the performance of such a contract. Westinghouse Electric appeared to believe that there would be further demand for such wind tunnels not only by the Government but by industry, and the retention of commercial rights in inventions would enhance their competitive position in supplying wind tunnels, utilizing their techniques. Westinghouse Electric was advised that the only procedure to accomplish this objective is the waiver under subsection 305(f) of the NASA Act, as implemented by NASA regulations. These regulations provide for the granting of waiver by the Administrator of NASA upon recommendation of the NASA Inventions and Contributions Board, and therefore any specific action cannot be foretold. These regulations do provide that waiver may be granted if it is shown that the invention has only incidental utility in the conduct of activities with which the Administration is particularly concerned, and has substantial promise of commercial utility. It would appear that any invention in the field of wind tunnel design would not be said to have only incidental utility in the conduct of activities with which NASA is concerned. Accordingly, this provision for waiver offered little promise that a waiver of the Government's rights in these inventions could be obtained.

Another provision for waiver is where it is shown that the invention is directed specifically to a line of business of the contractor with respect to which contractor's expenditure of funds in the field of technology to which the invention pertains has been large in comparison to the amount of funds for research and development work in the same field of technology expended under the contract of the administration in which the invention was conceived or first actually reduced to practice. It would appear that any invention in the field of wind tunnel design would not be likely to qualify under this provision. None of the other provisions for waiver appeared to offer better hope to obtain commercial rights. Accordingly, Westinghouse Electric now has the matter under consideration. It should be added that Westinghouse Electric has contracts with NASA in fields of technology where their commercial position is not so critical.

Case No. 2.—The Electric Storage Battery Co. was requested by McDonnell Aircraft Co., prime contractor for Project Mercury, to accept a subcontract for the development of a battery to be used in Project Mercury. Since the research and development to be undertaken pursuant to this request would parallel the Electric Storage Battery Co.'s own sponsored research program, and since the inventions emanating from this undertaking would be subject to the patent provisions of the National Aeronautics and Space Administration Act, Electric Storage Battery refused to enter into this subcontract with McDonnell Aircraft Co. Had it not been for the development of an alternative power supply by another NASA contractor, the refusal of Electric Storage Battery to take a subcontract with McDonnell Aircraft merely because of the NASA patent provisions could have seriously impaired or delayed Project Mercury.

Case No. 3.—The Motorola Co. has made certain discoveries in photographic processes and techniques which appear to have substantial promise of commercial utility. These discoveries in photographic processes and techniques were made

independently of any Government sponsorship and are presently the exclusive property of the Motorola Co. It appears, however, that these photographic processes and techniques may have application in the solution of problems of photography in space exploration, and officials of the Motorola Co. approached NASA to suggest a research and development contract to apply these techniques to problems in outer space photography but desired to ascertain whether such an NASA contract would result in the Government acquiring title to any of these inventions.

The answer to the foregoing question depends upon whether these inventions have been "actually reduced to practice," a matter not easily ascertainable. It is the policy of NASA not to acquire, except by direct purchase, rights in inventions that have been actually reduced to practice prior to the placing of a contract with NASA. Because the investigations undertaken by Motorola are still in an experimental stage, some questions remain as to whether or not their present state of development would, in each case, be considered as an "actual reduction to practice." Moreover, the Motorola Co. desires to continue their own research and development program in the commercial applications of these new photographic techniques and processes, and therefore desires to retain commercial rights to all new inventions. The NASA patent provisions leave in doubt the desirability of making a proposal to NASA to support such investigation.

Case No. 4.—The General Electric Co., under contract with an agency of the Department of Defense, had successfully completed the basic research and study to indicate the applicability to missile guidance of certain phenomena previously discovered by the General Electric Co. relating to superconductivity. NASA desired to join with the Department of Defense in applying these discoveries in superconductivity to space vehicle guidance. This joint sponsorship would, of course, necessitate the incorporation in the contract of the special NASA patent provisions which are less favorable to the contractor than those of the Department of Defense. The contractor refused to take the contract under such joint sponsorship, and presumably this investigation, if undertaken, will have to be supported solely by the Department of Defense. It should be added that the General Electric Co. is participating under research and development contracts with NASA in many other areas of research and development, and their reluctance to accept NASA's support in this specific case was undoubtedly attributable to their reluctance to grant any rights in the background inventions involved in this undertaking.

Case No. 5.—Narmco Industries, Inc., of San Diego, Calif., was requested by NASA to undertake some research investigations bearing upon the development of new structural materials for outer space application which would involve the impregnation into plastic or metal structures of fibers or disk-like flakes of ceramic or glass materials. Narmco would be responsible for the development of the end material but would be required to seek from the glass or ceramic industries the improved fibers and disk-like materials which were to be incorporated into the plastic or metal matrix. On investigation, Narmco found that the glass and ceramic industries were reluctant to participate in this program if their participation would subject them to the patent provisions of the NASA Act. Because of these difficulties, this proposed investigation did not materialize. However, it is understood that Narmco has accepted contracts with the Departments of the Air Force, Army, and Navy for the above research and development investigations.

Case No. 6.—The Associated Piping Engineering Co., of Compton, Calif., has apparently developed, independently of any Government sponsorship, a novel process for welding tungsten containing alloys. It appears that the process developed by Associated Piping could be applied to tungsten or molybdenum to achieve a NASA objective which is important in our space program. The NASA patent provisions, which would be required to be contained in such a contract, are presently delaying the placing of a contract with this firm. It appears that Associated Piping has a well-established proprietary position in this field. Not only would they be required to give the Government patent rights, if they were to enter into a contract, but would also be required to convey information developed under such a contract and background information under conditions where they may be made available to the public.

Case No. 7.—The Lesona Corp., subsidiary of Patterson-Moof Corp., was approached by NASA to develop a carbon dioxide analyzer for use in Project Mercury. Lesona, the owner of patents for this subject matter, had granted an exclusive license to another firm under all inventions covered by its patents and all improvements therein. Under the NASA patent provisions required in the proposed NASA contract, the Government would acquire exclusive rights in in-

ventions made in the performance of work under the contract and Lesona could be held to have violated the terms of its exclusive license agreement. Even though Lesona wanted to accept the NASA contract, the officials of the company decided that it would be in the best interests of the company to refuse the work with NASA.

The foregoing examples typify the difficulties encountered as a result of the patent provisions of the National Aeronautics and Space Administration Act. However, there is reason to believe that many other industrial firms are reluctant to do business with NASA because of the patent provisions of the act. NASA would not be aware of this reluctance because these firms have not been seeking business with NASA. We understand that the Industrial Nucleonics Corp. has, in testimony before the Congress, indicated their reluctance to do business with the Atomic Energy Commission because of the patent policy of AEC. We also understand that Industrial Nucleonics, for the same reason, will not do business with NASA. It is also understood that the Garrett Corp., of Los Angeles, would be unwilling to accept contracts with NASA in fields of technology related to their commercial business if inventions would be likely or necessary in the fulfillment of the work requirements of the contract. We also have reason to believe that Statham Instruments, of Los Angeles, would refuse to accept research and development contracts of NASA in certain fields of technology.

Because of its particular applicability to the problem at hand, the subcommittee desires to draw attention to an elaboration of a case cited in the foregoing. This case involves one of the leading space research organizations, and the communication here reproduced is from one of the Nation's best known industrial scientists.

GENERAL ELECTRIC CO.,
Syracuse, N.Y., December 17, 1959.

Hon. ERWIN MITCHELL,
Chairman, Patent Subcommittee, Committee on Science and Astronautics, House of Representatives, Washington, D.C.

* * * * * * *

For many years various elements of the General Electric Co., principally its research laboratory and general engineering laboratory, have been conducting studies of superconductivity phenomena in the field of cryogenics; i.e., studies of the electrical conductivity characteristics of materials which have been cooled to temperatures near absolute zero. For about 10 years, such studies were financed solely by General Electric Co. These tests and studies indicated the feasibility of using supercooled materials to produce a gyroscope which should have significantly greater accuracy than conventional gyroscopes. In the course of this research and development work, several inventions have been conceived and either actually reduced to practice, or constructively reduced to practice, by the filing of patent applications in the U.S. Patent Office.

In March of 1959, the Boston Ordnance District, Ordnance Department, U.S. Army, awarded contract DA–19–020–ORD–4831, which authorized General Electric to perform certain exploratory research directed toward the ultimate development of such a cryogenic gyroscope. In the above contract, the above prior General Electric inventions were excluded from the license grant of the "patent rights" article.

In October 1959, negotiations were started to supplement the initial contract by authorizing further work to include the final evaluation of the gyroscope motor and bearing devices, the completion of a laboratory model gyroscope which was then in an advanced stage of construction, and an evaluation of the motor and bearings when combined in one device. We were advised that approximately half of the financing for this further work was to be supplied by NASA, and that as a consequence, the NASA "property rights in inventions" clause must be included in the contract.

Some of the inventions excluded from the license grant of the original contract had not been actually reduced to practice at the time this proposed supplemental

agreement was under negotiation. To accept the supplemental agreement with the NASA "property rights in inventions" clause would have meant that when these inventions were first actually reduced to practice, they would become the exclusive property of the United States, subject to some possibilities of waiver, of which, however, General Electric could not, under NASA procedure, be contractually assured.

The future of such cryogenic gyros is not known with certainty at this time. They appear to have applications of interest to the commercial business of the General Electric Co. as well as potential applications for Government purposes. The patent rights represented by the inventions in question represent means by which General Electric may hope partially to recover the sums expended by it in this and related developments, not all of which have been successful, and to develop additional capital to continue research which will lead to future developments. For these reasons, the NASA terms were not acceptable to and were not accepted by the company.

As a result of subsequent negotiations, a contract with a non-NASA agency has been received which contains nonoppressive patent provisions and which permits the cryogenic work to go forward. While the parties were pleased that they could achieve this desirable end, such an alternative would not be available in every case. We believe, however, that it is clearly not in the national interest that NASA sponsorship of work in this field and under these circumstances be frustrated by a statutory requirement that it insist on patent provisions which, as prior testimony before this committee will show, most research oriented companies consider unfair, unreasonable, and unnecessary for any proper governmental purpose.

Very truly yours,

GEORGE L. HALLER.

The subcommittee's record contains evidence of other industrial firms, large and small, which have acknowledged reluctance to do research and development business with the Space Administration.

Finally, the subcommittee cannot ignore the candid and near-unanimous sense of disapproval which is being expressed for the current patent section of the Space Act by private enterprise. The ground swell of opposition to this part of the law, which has arisen in the relatively short period of 15 months of NASA operation, is remarkable. Even if there were no concrete evidence that the patent provisions of the Space Act are slowing down U.S. efforts to forge ahead in space exploration, this blanket dissatisfaction with the current law would be cause in itself for serious reappraisal.

RECOMMENDATIONS

The subcommittee recommends—

(1) that the amendment to section 305 of the National Aeronautics and Space Act of 1958 which is set out below be adopted by the full committee and reported to the House;

(2) that the "Statement of Congressional Intent," which follows the amendment, be approved by the full committee as part of the legislative history of the amendment; and

(3) that the proposed amendment below be substituted for section 11 of H.R. 9675, 86th Congress, when such bill comes before the full committee, and if H.R. 9675 or its equivalent is not acted upon that the full committee report the proposed change by other means.

TEXT OF SUBCOMMITTEE PROPOSAL

A BILL To amend section 305 of the National Aeronautics and Space Act of 1958, relating to property rights in inventions

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 305 of the National Aeronautics and Space Act of 1958 is amended to read as follows:

"PROPERTY RIGHTS IN INVENTIONS

"SEC. 305. (a) Each contract or other arrangement entered into by the Administration, and each subcontract at all tiers thereunder, which has as one of its purposes the performance of experimental, developmental, or research work, shall contain provisions prescribed by the Administrator governing the disposition of the rights to inventions conceived or first actually reduced to practice in the performance of such work thereunder in a manner calculated to protect the public interest and the equities of the contractor. In all cases such provisions shall reserve to the United States not less than an irrevocable, nonexclusive, nontransferable, royalty-free license for the practice of such invention throughout the world by or on behalf of the United States; and the reservation of such a license shall be deemed to provide for rights in inventions in a manner sufficient to protect the public interest and the equities of the contractor as required by this subsection in any case unless the retention or acquisition by or reservation to the United States of a greater right (1) is required under any other law of the United States or (2) is determined by the Administrator to be required in the interest of the national security or the general welfare.

"(b) The Administrator or his designee may, whenever the contract provides for the vesting of title to an invention in the United States, waive the rights of the United States to such invention on such terms and conditions as he determines to be in the best interest of the United States; but any such waiver shall be subject to the reservation of an irrevocable, nonexclusive, nontransferable, royalty-free license for the practice of such invention throughout the world by or on behalf of the United States or any foreign government pursuant to any treaty or agreement with the United States.

"(c) The Administrator may waive, upon the same terms and conditions as those provided in subsection (b), all or any part of the rights of the United States to inventions made in the performance of any work under any contract entered into by or for the Administration before the date of the enactment of this subsection. Any contract entered into by or for the Administration before the date of the enactment of this subsection on which final payment has not been made on such date may be amended without consideration to effectuate the purposes of this section; but no such amendment shall affect the status of inventions which have become the exclusive property of the United States.

"(d) The Administration shall be considered a defense agency of the United States for the purpose of chapter 17 of title 35 of the United States Code."

The following statement of intent, which incorporates standards to guide the Administrator in carrying out the proposed amendment, is herewith submitted for full committee consideration.

STATEMENT OF CONGRESSIONAL INTENT

It is the intent of the committee, in recommending revision to section 305 of the Space Act of 1958, to provide the National Aeronautics and Space Agency with further means by which the necessary advances and innovations in the fields of technology most pertinent to the missions of that Agency may be brought about in the shortest possible time and at the lowest cost.

Recognizing that continuation of the free enterprise system is dependant upon maintenance of adequate incentives to compete in business, and recognizing further that the greatest incentive in private ownership of inventions and patents thereon lies in the prospect of commercial utilization of the inventions, the committee urges the Administrator of the National Aeronautics and Space Agency to take

from private ownership only so much of the property right in inventions and patents thereon as may be necessary to fulfill the requirements of Government and protect the public interest.

In determining the disposition of the rights in inventions and patents arising out of research and development work done in connection with NASA contracts, it is here believed that the public interest, the equities of the inventors and their assignees, and the needs of the Government may best be served by obtaining for the Government not less than a royalty-free, nonexclusive, irrevocable license for the Government to use, for governmental purposes, the inventions or patents resulting from such work, leaving the remaining rights as well as title to the inventions and patents thereon to the inventors and their assignees. Where, however, retention of the remaining rights or title to such inventions or patents thereon in the inventors or their assignees would appear likely to run counter to the public interest or the needs of the Government, the Administrator should secure for the Government such additional rights, including the entire right, title, and interest if necessary, to prevent, reduce, or eliminate such adverse effect.

In determining whether the public interest and the equities of the contractor would be best protected by the reservation of an irrevocable, nonexclusive, nontransferable, royalty-free license, by the acquisition of the entire right, title, and interest to the invention involved, or by the reservation or acquisition of other rights, the National Aeronautics and Space Administrator should consider—

(1) Any of the following elements which may exist, being circumstances normally favoring retention of title by the contractor:

(A) Where the technological field being explored under the contract is so related to fields of commercial endeavor that the inventions likely to result would have substantial promise of commercial utility and their early development would be apt to benefit the national economy;

(B) Where insistence upon more than an irrevocable, nonexclusive, nontransferable, royalty-free license for governmental use would preclude or seriously impair contracts for the desired research and development work and alternative sources for the contract are not readily available;

(C) Where inventions likely to be involved under the contract have been conceived and constructively reduced to practice by the contractor prior to the contract; and

(D) Where the contractor has extensive competence and experience in the field of technology which is to be explored under the contract and inventions likely to result would be attributable to such competence and experience;

(2) Any of the following elements which may exist, being circumstances normally favoring the right to acquire title by the Government:

(A) Where the contract calls for exploration into fields which directly concern the public health, safety, or welfare and the inventions likely to result would be useful directly in such fields, and the public interest would be best served by making such inventions available for all to produce or use without payment of royalties;

(B) Where it is likely that any inventions actually reduced to practice under the contract will have depended in substantial degree upon the prior or parallel conceptions and work of other parties, governmental or private;

(C) Where the Government has been, at the time of contracting, the sole or prime developer of the field of technology involved, or has provided all or virtually all of the funds required for the operations and activities of the contractor in such field; and

(D) Where the field of technology involved in the contract is entirely new, without significant commercial or private history, and with little chance of nongovernmental development in the foreseeable future; and

(3) The following additional elements:

(A) The applicability of other laws of the United States relating to property rights in inventions;

(B) Whether conformity with the policies of other agencies of the United States in drawing up contract terms is desirable or necessary; and

(C) Such other standards and criteria as the Administrator may consider desirable or appropriate in carrying out the purpose of the space program.

Although the foregoing policy is intended to be implemented by the inclusion of appropriate clauses in contracts to be awarded by the Administration, nothing herein should be construed as a limitation on the right of the Administrator to use any and all patented inventions in carrying out the work of the Administration, whether the right to use is obtained by purchase or other agreement or is exercised under the provision of the act of 1910 (28 U.S.C. 1498).

Explanation of Current Law

In summary, the current patent section of the National Aeronautics and Space Act of 1958 (see p. 4 for text) provides that any invention made under a contract with the Space Administration "shall be the exclusive property of the United States * * *" (sec. 305(a)). It further provides that no patent may be issued to any person if the invention involved appears to the Commissioner of Patents to have "significant utility" for the space program unless the applicant swears under oath that he developed his invention without aid from the Space Administration; even then, the applicant may be overridden by the NASA Administrator and/or compelled to find any remedy due him through complicated appeal procedures (sec. 305 (c), (d), (e)). Government rights in inventions may be waived if the Administrator can show that "the interests of the United States will be served thereby" (sec. 305(f)).

Explanation of NASA Proposal

The National Aeronautics and Space Administration proposes to strike this section out of the law and substitute for it a provision which would place in the Administrator discretion for acquiring title to inventions produced under NASA research contracts. (See p. 11 for text.) In making his decision the Administrator would be required to "protect the public interest and the equities of the contractor."

He could, in cases where the contract provided for title rights in the Government, waive such rights. He would have authority to bring prior contracts into conformance with such new policies as might be promulgated through the waiver process.

Explanation of Subcommittee Proposal

In essence the subcommittee proposal (see p. 33 for text) is the NASA proposal with certain amendments, some major and some technical.

The major changes are these.

Section (a): The subcommittee has added a provision which would require the NASA Administrator in all research and development contracts to obtain for Government use not less than a royalty-free, irrevocable license on any inventions produced thereunder. There is no such statutory requirement in the NASA proposal. This provision would make absolutely certain that the Government would receive the benefits of the contract at no extra cost. In addition, the subcommittee has added a provision designed to expedite the administration of space research contracts. This provision simplifies the Administrator's duties by specifying that the public interest will have been adequately protected by the acquisition of a royalty-free, irrevocable license unless the Administrator determines (1) that he must acquire a greater right in the invention because of other Federal statutes, or (2) the national security or general welfare demands a greater Government right. The reason for (1), above, is quite clear. It is included to assure harmony and consistency of contract policies in cases where NASA is collaborating with other Government agencies, such as the Atomic Energy Commission or the Department of Health, Education, and Welfare, whose organic statutes or policies based thereon require title to certain inventions. In (2), above, the purpose is to prevent undesirable monopolies which might arise in connection with some invention which has paramount significance for the Nation's security or public welfare. Admittedly, the term "general welfare" is a broad one, but it is used in order to cover situations which may not involve security but which are nonetheless vital to humanity as a whole. Examples might be inventions leading to radical breakthroughs in medical science or those which might provide a navigational key to near-perfect safety in air travel—and both are possibilities which could arise through space research. Another reason for the broad phrasing is to cover situations in which the awarding of the patent to the contractor would be manifestly unfair to other private parties for reasons set out in the "Statement of Intent." (See 2 (B) and (C) p. 35.)

Other changes in sections (a), (b), and (c) are technical in nature and have been made only for purposes of draftsmanship or clarification. They have not changed the substance of the NASA proposal.

Section (b) permits the Administrator or his designee to waive Government rights to take title where the contract has provided for such rights, provided that a royalty-free, irrevocable license to use the invention is retained. Such license could be employed by either the United States or a foreign government pursuant to treaty. The purpose of this wording is to permit the Government to carry out its treaty obligations, some of which involve Government-owned property. It is not the purpose of this wording either to encourage or permit

foreign use of Government-owned inventions for commercial purposes, and it was for this reason that the subcommittee carefully refrained from using such wording in its amendment to section (a).

Section (c) extends the waiver right of the Administrator to cases involving contracts already in existence at the time of enactment of the new provision. It permits such contracts to be amended so as to conform to policies established under the revised law. However, it does not extend to inventions which, under prior procedures, have already become the property of the United States.

Section (d) is related to the secrecy provisions of the Patent Code. It permits the Administrator to request the Commissioner of Patents to withhold the issuance of patents on certain inventions when national security factors require secrecy. It is a provision retained from the present patent clause of the Space Act.

RATIONALE

Twenty years ago the Federal Government was spending about half a billion dollars a year on research and development. Ten years ago it was spending only a little over $1 billion. Today the Government is spending upward of $8 billion on research and development, including test and evaluation, about 56 percent of which is done under contract with private contractors. It is anticipated that the amount of Federal research contracted "out" will increase to 65 percent or better within the next several years. It is further anticipated that the National Aeronautics and Space Administration, which is one of the top three Government agencies from the standpoint of research volume (the Department of Defense and Atomic Energy Commission are the others), may become the leader in this area before the decade has run its course.

These facts are recited merely to place the importance of NASA's patent policy in its proper context. In view of the trends, it seems clear to the subcommittee that the issues here under consideration have marked significance not only for the progress of the present space program but even greater significance for its future success or failure.

Since the Government has become so prominent in research and development during the past few years and today is responsible for well over half of all the research funds spent in the Nation, it is not surprising that we frequently hear this argument: "If the Government pays for the invention, it should own the invention; if the Government fails to insist on title, it is guilty of unjustified 'giveaways' and failure to protect the public interest."

Having investigated the matter thoroughly, the subcommittee is not impressed with this argument per se. As a basic premise, it appears specious.

If Federal ownership of inventions produced under NASA contracts gave the Government an advantage it does not receive from an irrevocable royalty-free license, if it normally enhanced the public interest, if it actually stimulated commercial use of the invention—then the "Government pays—Government must own" concept would indeed be valid. Inquiry, however, shows that in a heavy majority of cases NASA ownership would accomplish none of these things.

The Government does not make, and never has made, any effort to protect its patents or see that they are worked. It does not sue

infringers. Neither does it grant exclusive licenses, without which the invention is generally ignored by private industry. Moreover, expert testimony received by the subcommittee indicates that if the Government did these things on a large scale it would be competing with private enterprise to the serious detriment of the latter.

This being the situation, there is little apparent value to the Government in claiming title to such inventions. The license which NASA would receive is a broad one. It not only permits complete Government use of the invention with no payment of royalties, but it allows the invented article to be produced by any contractor NASA chooses. The Space Administrator would not be limited to dealing with the inventor-contractor, but would be entirely free to turn to the lowest bidder. And it should be noted that even if the proposed new patent section to the Space Act did not require NASA to obtain this broad license in all its research and development contractual dealings, the Government has statutory authority to make or have made, for Government purposes, any patented product without being subject to injunction and without subjecting its product supplier to suit. In these cases the only remedy is a suit against the Government for reasonable royalties in the Court of Claims (28 U.S.C. 1498).

Taking title to inventions thus would mean little to NASA in most instances, whereas retention of title by the contractor is much more likely to result in commercial application and a corollary strengthening of the national economy. (See pt. II, "Summary of Testimony.")

On the other hand, the subcommittee does not subscribe to the argument it has frequently heard that there is never any real purpose in Government ownership of inventions produced under space research contracts. On reflection and study this argument appears to be as fallacious as the argument that the Government is indulging in "give-aways" whenever it takes only a license.

A number of conditions under which NASA ownership would seem warranted are set out in the foregoing "Statement of Intent."

The reasons for NASA ownership, however, may be summarized as follows:

First, NASA may wish to assert title as a protection against payment of royalties when the contractor who has done the research does not want a patent on his invention.

Second, title in NASA may be necessary as a matter of fairness—not as to the Federal equity involved, but in order to avoid giving one contractor an unearned favored position over other contractors; such circumstances might arise when extensive preliminary work in the field of the contract has been done either by the Government or private parties.

Third, NASA may wish to affect a dedication of the invention to the public where the invention sought will provide universal benefits for mankind or have crucial meaning for the Nation's security; in such cases, dedication might obviate the risk of excessive costs or the danger of nondevelopment by a private owner.

Fourth, it may be expedient and even necessary to assert title when failure to do so would result in inconsistency and confusion because of the differing policies of other Federal agencies.

Finally, it is important to note that NASA testimony before the subcommittee has disclosed the intent of the Space Administration—if the proposed change in the law is adopted—to acquire under certain

circumstances something more than a license but less than title. This would result from a contractual provision which would make the contractor's right to title a conditional one. The right would be voidable if the inventions specified in the contract were not developed and used so as to foster the public interest.

The subcommittee wishes to emphasize that the position it takes here is one which avoids the extremes. The proposal it recommends does not demand that title from space research contracts inevitably become the property of the United States, subject only to possible waiver; nor does it hinder the vesting of title in the United States when this is necessary or appropriate.

The subcommittee believes that its proposal, taken in conjunction with its "Statement of Intent," is a balanced compromise which will speed the space program, hold administrative problems on patent matters and inventions to a minimum, and, at the same time, insure the protection of the public interest.

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